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Occupational Stress, Personal Strain, and Coping Among Residents and Faculty Members

Dale Alexander, Ph.D., John S. Monk, Ph.D.,
and A. Patrick Jonas, M.D.

Abstract—Differences in ratings by 155 individuals at four levels of medical experience (faculty members and first-, second-, and third-year residents) on measures of occupational stress, personal strain, and availability of coping resources were examined. Multivariate and univariate analyses of data indicated significant differences in the measures among the experience levels. Measures of the availability of coping resources reflected the major source of differences, with the first-year residents reporting significantly fewer overall coping resoures than faculty members. No significant differences were detected among the four groups on overall measures of occupational stress and personal strain. There were differences between first-year residents and faculty members on the subscales measuring physical environment stress, physical strain, recreation, and self-care. The findings suggest that residency education interferes with first-year residents' abilities to cope and places their physical well-being at risk. The findings support the need for residents to employ coping strategies during the residency years and provide empirical guidance regarding the kind of coping strategies needed.

Do physicians differ in the way they experience and cope with occupational stress and personal strain during different stages of the medical career? A critical review of the literature on physician impairment and medical career stress reveals that this question has not been adequately answered.

Existing studies seldom make distinctions between the sources of stress in medicine (occupational stress) and the effects of stress upon physicians (personal strain). In many studies, inferences are drawn about the stress of medicine by documenting the incidence of suicide, substance abuse, emotional disorders, and physical risk factors among physicians (1). Most investigators neglect to assess or even mention how physicians cope, although a majority of individuals in medical training and physicians in practice apparently cope without becoming significantly impaired.

Confusion surrounds the multiple constructs describing physician stress. Sources of job stress have been attributed to close encounters and inadequate training with problem patients, suffering, fear,

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death, sexual problems, uncertainty, information overload, time-pressure and scarcity, the gravity and complexity of medical decision-making, developmental tasks, residency training, unrealistic expectations, sleep deprivation, and perceived lack of internal control (1–5). This range of constructs highlights the need for more generic, comprehensive measures for assessing occupational stress, personal strain, and coping among physicians.

A person-environment interaction model for explaining medical career stress would be beneficial. Usually, physician impairment is attributed solely to personal emotional problems or vulnerability and not to the interaction between the physician and intrinsically stressful elements within the medical training practice environment. Studies assessing how physicians cope with job stressors and related personal strains simultaneously are needed.

Focusing upon one medical specialty at a time is necessary for accurate assessment of physician stress. Certain specialties may be more stressful than others. Studies have shown that psychosocial supports vary significantly across different specialties (6) but not necessarily in residency programs within one specialty (7).

Comparing different experience levels within a given medical specialty is also important. The residency years are crucial to the formation of not only effective clinical skills but also coping patterns that will endure throughout a physician's career. Residency training has been described as a particularly stressful time where "survival" needs often conflict with educational and patient care needs (1). Psychiatric hospitalization and impairment rates among residents appear disproportionately high in light of the relatively brief training period (8–9).

Medical educators have speculated that the first year is the most stressful of the residency years (1). Empirical evidence supporting this claim is lacking. An association among sleep deprivation, depression, and problem-solving deficits was reported in a study (10) of 12 first-year residents, and 30 percent of 53 first-year residents were reported to be depressed in another study (11). Neither study, however, focused exclusively upon one medical specialty nor compared first-year residents with second- and third-year residents or faculty members. Nelson and Henry (3) and Frey and colleagues (5) went further by comparing different resident-year groups from the same specialty, family medicine. Nelson and Henry found that problems with lack of time and career-decision doubts decreased as the resident advanced through training. Frey and colleagues assumed stress in residency training was inversely related to the degree of internal control and found faculty members to manifest significantly more internal control than first- and second-year residents; residents generally showed a linear increase in perceived internal control as they progressed through residency training.

Deficiencies in existing knowledge of physician stress makes it difficult to apply available information in curriculum planning. Mumford (12) highlighted the need for further research by expressing concern that "in the absence of data on stressful experiences (during medical school and residency training), the rhetoric of stress and overwork may take on the guise of reality." She noted the "need to determine whether the educational system damages medical students and residents and whether the effects are lasting and individual risk factors are associated with being damaged."

The purpose of the investigation reported here was to provide a comprehensive assessment of the relative amounts of occupational stress, personal strain, and the availability of coping resources among individuals at the four levels of experience in one medical specialty, family medicine. The investigators specifically attempted to detect whether differences in occupational stress, personal strain, and coping were manifested by a cross-section of faculty members and first-, second-, and third-year residents from a representative number of family medicine residency programs.

Methods

Two issues were examined. First, do family medicine faculty members and first-, second-, and third-year residents report significant differences in their experience of occupational stress and personal strain? Second, are the coping resources available to mediate occupational stress and personal strain significantly different among these four groups? The independent variable was the experience level of the subjects. The dependent variables were measures of occupational stress, personal strain, and the availability of coping resources and the 14 subscales which comprised these measures. Multivariate analyses of variance procedures were used to determine whether significant differences among the experience levels existed on the dependent variable measures.

The sample consisted of 210 residents and faculty members in eight family medicine residency programs in five states surveyed in May and June 1982. Eighty-two percent ($n = 172$) of the individuals responded, and 74 percent ($n = 155$) provided complete data for analyses. The sample consisted of 44 faculty members and 41 first-, 39 second-, and 31 third-year residents. The respondents were representative of the national distribution of family medicine residents and residency faculty members with respect to minority status and gender (13).

A questionnaire mailed to the individuals contained 20 items concerning demographic information and practice characteristics. Information on the dependent variables was obtained by using the occupational environment scale, personal strain questionnaire, and the personal resources questionnaire developed by Osipow and Spokane (14). These three instruments provide a standardized set of criteria for objectively assessing the variables and consist of a total of 140 items rated on a 5-point Likert scale. Subscales on each instrument were each composed of 10 items. The instrument set consists of 14 subscales: role overload, role insufficiency, role ambiguity, role boundary, role responsibility, physical environment stress, vocational strain, psychological strain, interpersonal strain, physical strain, rational/cognitive coping, social support, self-care, and recreation. Detailed explanations of the content of each

TABLE 1

Reliability Estimates for Measures of Occupational Stress, Personal Strain, and Coping in Study of 44 Faculty Members and 111 Residents in Eight Family Medicine Residency Programs in Five States, 1982

Scale/Subscale	Alpha
Occupational stress	.90
Role overload	.76
Role insufficiency	.88
Role ambiguity	.81
Role boundary	.77
Role responsibility*	.64
Physical environment	.81
Personal strain	.94
Vocational	.76
Psychological	.89
Interpersonal*	.76
Physical	.84
Coping	.91
Recreation	.75
Self-care	.75
Social support	.88
Rational/cognitive	.84

* This scale demonstrated factor structures which indicated that, for the sample, the basic constructs of the scale were questionable.

TABLE 2

Mean Ratings on Occupational Stress, Personal Strain, and Coping Scales and Subscales of 44 Faculty Members and 111 Residents in Eight Family Medicine Residency Programs in Five States, 1982

Scale/Subscale	Experience Level							
	First-Year Residents (*n* = 41)		Second-Year Residents (*n* = 39)		Third-Year Residents (*n* = 31)		Faculty Physicians (*n* = 44)	
	Mean*	S.D.	Mean*	S.D.	Mean*	S.D.	Mean*	S.D.
Occupational stress*	139.95	26.75	127.82	17.72	128.42	18.69	133.68	26.87
Role overload	28.41	8.21	26.72	4.64	26.45	6.98	27.86	6.53
Role insufficiency	19.02	7.57	17.82	5.18	16.58	4.25	20.07	8.07
Role ambiguity	22.12	6.98	20.77	5.16	20.35	4.48	22.27	6.74
Role boundary	23.02	6.80	20.87	5.41	21.61	5.63	20.77	7.23
Role responsibility†	26.49	4.93	23.79	4.42	26.00	5.90	28.50	5.42
Physical environment	20.89	6.53	17.85	4.63	17.42	5.42	14.20	4.22
Personal Strain*	81.61	21.67	74.90	17.24	71.48	15.71	71.16	20.47
Vocational	17.88	5.08	15.77	2.95	15.39	3.24	15.93	3.69
Psychological	20.78	7.61	19.10	5.43	18.58	5.72	18.80	6.84
Interpersonal†	23.22	5.49	22.00	5.43	20.55	5.46	20.86	6.36
Physical	19.73	6.32	18.03	6.54	16.97	5.09	15.57	6.16
Coping	124.20	20.43	130.18	16.41	132.26	16.48	137.07	23.52
Recreation	24.22	5.42	26.49	4.93	27.39	5.28	29.09	5.88
Self care	24.24	6.64	24.59	5.16	25.55	6.21	28.80	7.47
Social support	41.90	6.93	41.77	7.53	43.16	6.41	41.70	8.29
Rational/cognitive	33.83	7.48	37.33	4.73	36.16	6.56	37.48	7.49

* The mean ratings for each of the three scales were derived by totaling the mean ratings for the subscales under the scale. The mean ratings for each subscale were derived by totaling the mean ratings of the 10 items under each subscale. Each item was rated on a 5-point Likert scale. Consequently, the range was 10 to 50 for each subscale, and the range was 60 to 300 for the work stress scale, 40 to 200 for the personal stress scale, and 40 to 200 for the coping scale. Higher scores on the stress and strain scale indicated greater levels of stress or strain. Lower coping scores indicated the availability of fewer coping resources.

† This scale demonstrated factor structures which indicated that, for this sample, the basic constructs of the scale were questionable.

scale and subscale were provided by Osipow and Spokane (14). High ratings on the occupational stress and personal strain scales and subscales indicate relatively high levels of stress and strain. Low ratings on the coping scale and subscales indicate relatively low availability of coping resources. Scale and subscale reliability estimates (Cronbach's alpha) for the study presented here are reported in Table 1. A factor analysis of each scale raised doubts as to the validity of interpersonal strain and role responsibility subscales with the sample employed in the study.*

Results

The mean ratings and standard deviations for full-scale and subscale measures of occupational stress, personal strain, and coping are presented in Table 2. A multivariate analysis of variance was used to examine the effects of the subjects' experience level (first-, second-, and third-year residents and faculty members) on the composite measure of occupational stress, personal strain, and the availability of coping resources. The analysis revealed that effects attributed to experience level approached the $p = .05$ level of significance (Wilks lambda = .90, $F = 1.84$, $df = 9/353$, $p = .06$). Standardized discriminant function coefficients indicated that differences in the availability of coping resources was the major contributor to the differences among the experience levels. This was also confirmed by the presence of a significant univariate experience level effect for the coping measure ($F = 3.07$, $df = 3/151$, $p = .03$). Scheffé's follow-up procedures indicated that first-year residents reported significantly fewer coping resources than faculty members. ($F = 2.96$, $df = 3/462$, $p < .05$).

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* Details of the factor analysis are available from the author.

Multivariate examinations of the subscales for the occupational stress, personal strain, and coping measures revealed significant differences among the respondents at the four levels of experience with respect to the availablity of coping resources (Wilks lambda = .80, $F = 2.91$, $df = 12/391$, $p = .001$), occupational stress (Wilks lambda = .56, $\mathrm{F} = 5.20$, $\mathrm{df} = 18/413$, $p = .001$), and personal strain (Wilks lambda = .87, $F = 1.79$, $df = 12/391$, $p = .05$). The results of univariate follow-up analyses for the coping, personal strain, and occupational stress subscales are presented in Table 3.

There were significant differences on the recreation, self-care, and rational/cognitive coping subscales of the coping instrument (Table 3). Examination of the coping subscale differences using Scheffé's procedures indicated that significance was obtained only when the first-year residents and the faculty members were compared. The first-year residents scored significantly lower than the faculty members on recreation ($F = 5.73$, $df = 3/462$, $p < .001$) and self-care ($F = 3.51$, $df = 3/462$, $p < .05$). Follow-up procedures revealed a tendency for the first-year residents to score significantly lower on rational/cognitive coping than faculty members ($F = 2.1$, $df = 3/462$, $p < .10$). Examination of the means (Table 2) revealed that respondents at all levels reported social support as the most available coping resource.

TABLE 3

Analysis of Variance of Measures of Occupational Stress, Personal Strain, and Coping in Study of 44 Faculty Members and 111 Residents in Eight Family Medicine Residency Programs in Five States, 1982

Scale/Subscale	*F*	*p*
Occupational stress	2.26	.08
Role overload	.91	.44
Role insufficiency	1.90	.13
Role ambiguity	.94	.42
Role boundary	2.09	.35
Role responsibility*	5.78	.001
Physical environment	11.48	.0001
Personal strain	2.56	.06
Vocational	3.22	.02
Psychological	.93	.43
Interpersonal*	1.73	.16
Physical	3.46	.02
Coping	3.07	.03
Recreation	5.90	.001
Self-care	4.39	.005
Social support	.29	.83
Rational/cognitive	2.61	.05

* This scale demonstrated factor structures which indicated that, for this sample, the basic constructs of the scale were questionable.

Significant differences among the experience level groups existed on the physical strain and vocational strain subscales of the personal strain instrument (Table 3). The first-year residents reported significantly greater ($F = 3.28$, $df = 3/462$, $p < .05$) physical strain than did faculty members. A tendency ($F = 2.43$, $df = 3/462$, $p < .10$) toward significance existed between the first-year and third-year residents on vocational strain, with the first-year residents reporting higher levels of vocational strain. The mean ratings for interpersonal strain were found to be the highest of the subscales at all experience levels (Table 2). However, problems previously noted with the factor structure of the scale limited its application in the study, even though an acceptable reliability (alpha = .76) was obtained for the scale.

Significant differences existed on the physical environment and role responsibility subscales of the occupational stress instrument (Table 3). There were differences between faculty members and first-year residents ($F = 11.44$, $df = 3/429$, $p < .001$) and between faculty members and second-year residents ($F = 3.33$, $df = 3/429$, $p < .05$) on the physical environment subscale. First- and second-year residents scored significantly higher than faculty members on stress emanating from the physical environment. Second-year residents scored significantly lower ($F = 5.74$, $df = 3/429$, $p < .001$) than faculty members on role responsibility. This subscale, however, displayed a low reliability (alpha = .64) and poor factor structure, and this limited any conclusions that might be drawn about the significant differences found between faculty members and second-year residents on the role responsibility subscale. Examination of the mean ratings (Table 2) revealed role overload as the subscale that respondents at all experience levels reported as the most stressful.

In summary, the multivariate analyses and associated follow-up procedures indicated that coping resources contributed the most to differences between the first-year residents and faculty members. Analysis of variance procedures revealed significant differences on six out of the 12 subscales found to be adequately supported by factor analysis. Scheffé's follow-up procedures confirmed that four significant ($p < .05$) subscale differences between first-year residents and faculty members and one subscale difference between second-year residents and faculty members were present.

Discussion

Do family medicine residents and faculty members differ significantly in the way they cope with and experience occupational stress and personal strain during different developmental stages of their medical careers? The findings from the investigation reported here strongly suggest the answer is yes. There were similarities among the four experience levels on role overload, interpersonal strains, and social support. First-year residents, however, differed significantly from faculty members on physical environment stress, physical strains, recreational coping, and physical self-care dimensions. The experience level similarities and differences on measures of occupational stress, personal strain, and the availability of coping resources confirm some and contradict other commonly held assumptions about medical career stress.

The respondents at all four experience levels perceived their major stress as role overload: their job demands exceeded the resources and time available to accomplish the work load. They rated their work load as unreasonable and unsupported by needed resources and indicated by their ratings that they considered themselves as working under tight time deadlines. The respondents rated interpersonal strains stemming from dynamic tension created by the lack of time for self, spouse, family, and friends as the major effect of their occupational stress. They often reported the need to withdraw and be alone in addition to the conflicting need to spend time with others. The subjects rated social support as their most frequently used coping resource. According to their ratings of the items, they were supported and helped by those around them and felt valued and close with someone who was available to discuss work problems and support them with tasks at home.

Surprisingly, there were no significant differences between the three levels of residents and the faculty members on the full-scale measures of occupational stress. Physical environment stress was the only subscale to differentiate among the experience levels. Ratings of items on the physical environment stress subscale indicated that both first- and second-year residents experienced more erratic work schedules and feelings of personal isolation and felt more exposed to noxious stimuli than did faculty members.

Likewise, significant differences were not found among the four experience levels on full-scale measures of personal strain stemming from occupational stress. However, first-year residents reported experiencing significantly more physical strain than faculty members. Ratings of the items on the physical strain subscale indicated that first-year residents, compared with faculty members, experienced more fatigue and disturbance in sleeping and eating patterns, were more concerned with their own physical symptoms and health, and were more likely to overuse alcohol.

While only subtle differences were indicated in occupational stress and personal strain, major differences were seen in the availability of overall and specific coping resources between first-year residents and faculty members. First-year residents reported the availability of significantly fewer overall coping resources than did faculty members, principally on the subscales measuring recreation and self-care behaviors. The likelihood of first-year residents taking advantage of relaxing, satisfying leisure time activities (the recreation subscale) and taking care of themselves by obtaining sufficient sleep and exercise and avoiding harmful substances (the self-care subscale) was significantly reduced in comparison with faculty members.

Examining the similarities and differences using a person-environment interaction model clarified an important relationship among occupational stress, personal strain, and the availability of coping resources not previously demonstrated. Specifically, by examining these three measures simultaneously, it was possible to demonstrate that availability of coping resources, and not the presence of actual occupational stress, was the primary contibutor to differences among first-, second-, and third-year residents and faculty members.

The findings indicated that first-year residents were more vulnerable to occupational stress and personal strain because of their significant lack of overall coping resources, especially recreational and self-care resources. The speculation by some medical educators that first-year residents were more stressed than other residents solely because of the nature of their work was not supported. Instead, stress among first-year residents was more related to a lack of coping resources than to sources of occupational stress and personal strain. When stated as a person-environment interaction, first-year residents had significantly less recreation and physical self-care coping resources available to mediate the negative effects of significantly greater physical environment stress and physical strain. The reciprocal interaction of these dimensions can be seen as one which would have a tendency to increase the duration and magnitude of physical environment stress and physical strain and to decrease the availability of recreation and self-care coping resources. Long-term stress effects can be predicted in the presence of significant occupational stress and personal strain unless coping resources are available. However, the very nature of physical environment stress and physical strain, the two significant subscales found in this study, makes it difficult for the individual experiencing occupational stress and personal strain to take advantage of available coping resources.

The study reported here partially answered Mumford's (12) challenge to provide facts clarifying whether or not the educational system damages residents and what risk factors are associated with being damaged. The findings suggest that the residency educational system may be hazardous to the health of first-year residents, at least temporarily, by interfering with their ability to cope effectively with occupational stress and personal strain. This possibility was supported by closer examination of the relationship between specific subscale dimensions and elements of the residency educational system. Two recurring themes emerged from examining the subscales that had the highest ratings and differentiated first-year residents from faculty members. Scarcity of time and time management dilemmas were more prevalent for first-year residents and interfered with their coping ability and, thus, the physical well-being of first-year residents appeared compromised during residency training.

High levels of role overload, interpersonal strain, physical environment stress, and physical strain and significantly reduced levels of recreation and self-care coping suggested that first-year residents, compared with other residents, experienced more work-related constraints upon their recreational activities, leisure and weekend time, and the likelihood of exercising, using relaxation techniques, or obtaining sufficient sleep. Prior studies (1, 3) have cited scarcity of time as a frequent problem for residents but have not provided empirical clarification of the negative effects of scarcity of time on the availability or use of coping resources.

The results obtained from the physical environment stress subscale indicated that first- and second-year residents, when compared with faculty members, felt significantly more exposure to environmental toxins and extreme physical conditions in the work environment, felt their work schedules were more erratic, and experienced greater feelings of personal isolation. The first-year residents were found to have 24-hour "on call" responsibility an average of one night out of three. The potential negative effects of sleep deprivation associated with residents' call schedules has been cited (4).

The residency system also requires first-year residents to rotate through a new specialty work environment monthly. Entering new work groups with varying expectations and degrees of receptivity may contribute to residents' feelings of personal isolation. Residents are typically exposed to infectious diseases, unpleasant odors, and dangerous chemicals and substances. First-year residents, in general, appear less comfortable and less able to cope with such conditions than faculty physicians.

Results from the physical strain subscale indicated that the first-year residents in the study experienced significantly more physical symptoms of strain, including feelings of tiredness, worries about health, a greater tendency toward disturbance in sleep patterns, unplanned weight changes, and a greater likelihood for overuse of alcohol, than did faculty members. Many of these physical strains are also signs and symptoms of moderate to severe depression. Valko and Clayton (11) found 30 percent of the first-year residents in their study to be depressed clinically, but those authors did not compare first-year residents with individuals at other experience levels. Findings from the present study suggest that first-year residents have a greater likelihood of being depressed than faculty members.

With relation to self-care, the first-year residents indicated they were less likely than faculty members to exercise regularly, obtain eight hours of sleep, be careful about diet, avoid harmful substances (alcohol, tobacco, or coffee), or use relaxation techniques. Positive relationships between the practice of these preventive health behaviors and good physical health status have been reported elsewhere (15). Physicians are taught to encourage these health promotion behaviors in their patients, but the present study paradoxically suggests residency education may not encourage residents, especially first-year residents, to practice what they are taught to preach.

Conclusions

The findings presented here support the need to address stress management issues in residency training, especially in the training of first-year residents. Identifying coping strategies to be strengthened can be empirically guided by examining the subscale findings in this study. Evidence of scarcity of time implies a need for training in time management techniques or, where appropriate, reducing work loads to more manageable levels. Coping deficits suggest that efforts need to be made in the areas of health promotion and recreational and leisure time protection. Such efforts require action rather than mere encouragement.

High levels of physical environment stress and physical strain suggest that coping strategies aimed at reducing erratic work schedules and sleep deprivation would be beneficial. A "night float system," for instance, offers one means of lessening physical strains from sleep deprivation associated with more traditional call schedules.

The presence of reported high levels of social support raises questions as to whether support groups deserve a high priority during residency training. Time for oneself may be a more needed coping strategy. High levels of interpersonal strain, however, indicate there may be a need for groups in which problem patients, interactions with other physicians, and personal dynamics can be discussed. Additionally, marriage and family retreats may be useful.

Family medicine residents and faculty members were chosen for this study because educators in family medicine have expressed a high level of concern and investigative openness about medical career stress. Also, family medicine programs have devoted a great deal of effort to developing psychosocial supports for residents (7). Additional research in other medical specialty areas should be conducted to provide more generalized statements concerning occupational stress, personal strain, and the availability of coping resources among physicians at all levels. Also, the longitudinal assessments of the three measures might lead to an understanding of how these dimensions affect physician dropout and how dropout might affect research such as that reported here. Until further research is conducted, residency directors should promote stress management as a significant component of their training programs. Such efforts would ease the educational experience for residents and promote their well-being. As more residency applicants express interest in programs which allow opportunities to learn and promote personal and professional well-being, the presence of a well conceived stress management curriculum may also prove to be a potent marketing tool for attracting residents to residency programs.

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Clinical Practice of Medical School Faculties: An AAMC Survey of Problems and Issues

Robert F. Jones, Ph.D., Marcie Foster Mirsky, and Joseph A. Keyes, Jr.

Abstract—This study reports the results of a survey by the Association of American Medical Colleges (AAMC) to identify the salient problems and issues regarding medical school faculty clinical practice in the views of faculty members and administrators in academic medical centers. The population surveyed consisted of university vice-presidents for health affairs, teaching hospital directors, and medical school deans, department chairmen, and faculty representatives. A content analysis of the narrative responses revealed that the apportionment of faculty time to create the appropriate institutional balance among teaching, research, and service missions was the most frequently mentioned concern. Other dominant themes included (*a*) threats to the patient base needed for teaching and research and/or to future income posed by the new competitive and reimbursement environment and (*b*) changes required in modes of faculty practice to respond to the new environment. The latter included the need for organizing practice activities into a "true group practice," a change that would accommodate growing demands of purchasers for integrated systems of care. Hospital directors were particularly concerned with issues of faculty-hospital relationships. Results of the survey provide an agenda for a recently formed AAMC ad hoc Committee on Faculty Practice, which will propose initiatives by the AAMC to assist its member institutions in responding to the issues raised.

The clinical practice of medical school faculty members has always been integral to the fulfillment of the academic mission of medical schools. The American medical education system is grounded in bedside teaching requiring clinical faculty members to demonstrate diagnostic thinking and therapeutic procedures in the care of patients. In recent years income generated from faculty practices has become significant to the fiscal support of medical schools. Declining state and federal support for medical education and research and the expansion of clinical faculties in the last two decades have contributed to this trend. With rapid changes taking place in the health care delivery system, the structure and arrangements for faculty practices are at the center of disequilibrating forces internal and external to the academic medical center. These factors prompted the Association of

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For related editorial, see p. 949.

American Medical Colleges (AAMC) to initiate a survey to identify the salient problems and issues facing medical school faculty clinical practices in the views of faculty members and administration officials in academic medical centers. In this report, the authors present the results of that survey.

Method

The authors surveyed 931 persons at 125 of the 127 accredited U.S. medical schools and their associated universities and teaching hospitals. The University of Minnesota–Duluth was excluded because it has no clinical program, and the Uniformed Services University of the Health Sciences was excluded because the nation's military hospital system provides a guaranteed clinical base. At each of the other medical centers, the survey instrument was provided to the university official who served as a member of the Association of Academic Health Centers (hereinafter referred to as the vice-president), the medical school dean, the teaching hospital director, and the medical school chairmen of the departments of medicine and surgery, the chairmen of two other clinical departments, and a faculty representative. Those referred to as the vice-presidents (n = 66) were only those who occupied a separate position from the deanship. The hospital directors (n = 115) were only those whose hospitals had an affiliation in which a majority of the department chairmen of the medical school also served as chiefs of service in the affiliated hospital. The two department chairmen other than those of medicine and surgery were selected by the medical school dean. Similarly, the faculty representatives were selected by the dean with suggestions by the authors that consideration be given first to the chairman of a practice plan advisory committee (if applicable and not included in the other groups) and secondly to a faculty member serving on that committee or a faculty member active in clinical practice.

The survey was mailed in February 1985, and there was a follow-up mailing for nonrespondents in April. Vice-presidents and teaching hospital directors were sent and returned survey forms directly. Forms for all other respondents were sent to the medical school dean for distribution but were returned directly by each respondent in envelopes provided.

The response rates to the survey are shown in tables 1 and 2. The deans had the highest rate of return (73 percent) followed by chairmen of the departments of medicine and surgery. The rate was lowest for the hospital directors (45 percent). The distribution of the other chairmen was heavily skewed toward pediatrics and obstetrics/gynecology but had some representation from other specialties. Although the response rates may limit analyses, the authors believe that the major issues pertaining to faculty practice were fully conveyed by the responses received.

The survey instrument developed by the authors was standard for all respondents, with a few exceptions. It included the following questions designed to elicit open-ended responses:

> 1. Please identify and describe the most significant policy or operational issues your institution is facing with respect to the clinical practice of your faculty.
> 2. Some in the medical education community have suggested that the financial incentives of clinical faculty practice pose a developing conflict with the academic mission of institutions. Do you perceive this conflict developing at your institution? Please give your views on this issue.

TABLE 1

Respondents from 125 U.S. Academic Medical Centers to Survey on Medical School Faculty Clinical Practices, 1985

Respondents	No. Surveyed	No. Responding	Percent Responding
University vice-presidents for health affairs*	66	34	52
Teaching hospital directors	115	52	45
Medical school†			
Deans	125	91	73
Faculty representatives	125	67	54
Chairmen of medicine	125	84	67
Chairmen of surgery	125	81	65
Other chairmen	250	142	57
Total	931	551	59

* Survey forms were sent to all members of the Association of Academic Health Centers; however, for this analysis, members associated with osteopathic medical centers were excluded. Vice-presidents who were also medical school deans were excluded here but included under "Deans" below.

† Two schools were excluded: the University of Minnesota-Duluth School of Medicine and the Uniformed Services University for the Health Sciences F. Edward Hébert School of Medicine.

TABLE 2

Number of Department Chairmen and Faculty Representatives, by Specialty, from 125 U.S. Medical Schools Responding to Survey on Medical School Faculty Clinical Practices, 1985

Department	Chairmen	Faculty Representatives
Medicine	84	17
Surgery	81	13
Pediatrics	38	3
Obstetrics/gynecology	32	2
Psychiatry	14	4
Neurology	11	4
Anesthesiology	8	1
Radiology	8	1
Ophthalmology	7	4
Orthopedics	7	3
Family practice	6	4
Pathology	3	2
Dermatology	3	1
Emergency medicine	2	1
Physical medicine	0	1
Geriatric medicine	1	0
Otolaryngology	2	1
Other	0	5
Total	392	67

3. Do you see a need to change the form, structure, or governance of the clinical practice of your faculty? If yes, please specify the nature of the change(s) and your views of why the change(s) are needed.

The hospital directors were asked to respond to the first question from both the hospital and medical school perspective, that is, the issues the hospital was facing and the issues the hospital director viewed the medical school to be facing. The hospital directors were also asked to describe any joint ventures they were currently involved in with the faculty practice plan. A final question, the results of which are not reported here, asked each respondent to describe his role in the governance of the faculty practice plan.

Results and Discussion

A content analysis of the narrative comments made in response to these first three questions was conducted. The purpose of this analysis was to categorize the issues identified in the responses and to designate the issues by codes for further quantitative analysis.

There were several problems in conducting this analysis. The first was the definition of an "issue." Comments varied in specificity. For example, one response on an issue was "the distribution of the funds" while another response on the same issue was "... whether or not clinical departments which are entirely supported by their practice earnings and receive no University funds should also be coerced into the support of non-clinical departments which are inadequately compensated by the University and unable, for reasons of scientific excellence, to generate sufficient federal funds for their own research support." To deal with this variability, the authors developed a categorization which allowed different levels of specificity. For example, the comment "need to develop more primary care services to ensure referrals" was categorized as the issue of "primary versus secondary/tertiary care services," a subdivision of the issue area of "changes in modes of practice," which itself came under the general heading of "practice environment." For the summary reported here, the authors quantified the responses at the second most inclusive level. A lack of specificity in many responses precluded a meaningful quantitative analysis at a more specific level. Table 3 lists 26 categories of issues grouped into six divisions. The percentages of respondents in each group who mentioned one or more issues within each category are given. Table 4 gives the rank order of the issues most frequently mentioned by each group.

Any sort of classification scheme such as the one used in this study tends to distort the dynamic interrelationships among issues. However, the descriptions of the issues which follow demonstrate the connectedness among issues within and between categories that was reflected in the narratives. Also, important differences among groups of respondents in terms of their specific views on issues are noted, although they were not quantified.

FINANCING MEDICAL EDUCATION

A recurring theme was the growing dependence that medical schools have on practice income to support the medical education enterprise. In a vast majority of the responses on this issue, this dependence was seen as being presently too great or in danger of becoming too great. This dependence was perceived as an inevitable result of inadequate and declining state and federal support for medical education and federal support of research. The department chairmen particularly viewed this dependence as creating pressures to expand clinical practice simply to maintain the current level of support for medical education, and they raised questions about the ability of schools and departments to sustain current levels. A few respondents, noting similar problems because of a decline in other sources of support, reported that clinical practice needed to be emphasized more at their schools in order to compensate for the declines and suggested that the current income from faculty practices was too little.

An infrequently mentioned issue was the concern about future funding for graduate medical education and the possibility that clinical practice income might be needed in the future to support residents. This issue was identified mostly by the vice-presidents, hospital directors, and chairmen of departments other than medicine, surgery, pediatrics, and obstetrics/gynecology.

FACULTY MANPOWER

The apportionment of faculty time to create the appropriate institutional balance among teaching, research, and service missions was the most frequently mentioned issue overall and by each group except vice-presidents, by whom it was ranked second. The percentages of respondents who mentioned this issue ranged from 88 percent for hospital directors to 38 percent for vice-presidents. This high frequency may have been due in part to the fact that the second question specifically asked for comments directed to this issue. However, this issue was the most frequent in responses to the first question. Based on specific comments, the respondents were divided between those who believed that clinical practice was diverting attention from teaching and (more often) research and those who saw it as not being given sufficient attention in the apportionment of faculty time because of uninterested faculty members or inadequate financial incentives for practice. Although financial incentives, the focus of question two, were given by most respondents as the reason for a diversion of attention from teaching and research to clinical practice, they were not the only reason cited. Even at schools in which the income formula system did not provide financial incentives to faculty members, respondents saw clinical practice as intruding into the academic mission because of the increasing needs of the school for practice income. More time in practice was reported needed to maintain the level of financial support in the face of declining levels of reimbursement, more time consumed in the supervision of care, and increasing documentation requirements.

Table 5 provides the responses to the question of whether or not the financial incentives of practice posed a conflict with the academic mission. The groups clearly tended to support the proposition, except the vice-presidents and the surgery chairmen. Those who responded "no" gave a variety of reasons for their answer. Some respondents saw no inherent conflict. In their view, the financial incentives make the academic mission possible and even enhance it by providing a patient base for teaching and research purposes and to provide financial support and attract a high-caliber faculty. Others believed that a conflict was foreseeable but was being avoided in their institutions by controlling incentive systems, time and effort reporting, and promotion criteria emphasizing academic productivity. A third group of respondents felt the problem was being averted by large base salaries made possible by significant state and hospital support. A fourth group noted other circumstances that diminished the potential for conflict, for example, (*a*) an institutional mission which does not emphasize research or (*b*) a dependence on indigent care which negates opportunities to earn high practice incomes.

The hospital directors in particular were frequently among those calling for faculty members to devote more time and effort to clinical practice. At the same time, many of these directors acknowledged that the increased time and effort represented a conflict with the medical school's teaching and research missions. Their suggested resolution of this conflict was based on recommended changes to the faculty appointment, promotion, and tenure policies.

In addition to 35 percent of the hospital directors, approximately one-fourth of the vice-presidents and medicine and pediatrics chairmen mentioned concerns about appointment, promotion, and tenure policies. The predominant theme in these responses was that clinical practice should be given more recognition in appointment and promotion policies. The traditional image of the "triple-threat" clinical faculty member, expert in teaching, research, and patient care, was no longer viable in this view. These respondents believed that medical schools must begin to appoint people whose primary duties will be in clinical practice and teaching, with other faculty members de-

TABLE 3

Percentage of Respondents from 125 U.S. Academic Medical Centers Listing at Least One Issue in 26 Categories of Issues Concerning Medical School Faculty Clinical Practice, 1985

Issues	Vice-Presidents (n = 34)	Deans (n = 91)	Hospital Directors (n = 52)	Department Chairmen					Faculty Representatives (n = 67)
				Medicine (n = 84)	Surgery (n = 81)	Pediatrics (n = 38)	Obstetrics/Gynecology (n = 32)	Other (n = 72)	
Financing medical education									
Dependence on practice income to support medical education	12	16	23	21	30	18	31	31	16
Future support for graduate medical education	12	1	10	1	1	0	0	7	0
Faculty manpower									
Apportionment of faculty time	38	47	88	67	53	74	63	63	66
Appointment, promotion, and tenure policies	26	13	35	25	14	24	16	17	16
Recruitment and retention problems	6	5	10	2	16	8	6	8	7
Practice environment									
Threats to patient base and/or future income	35	29	27	32	19	39	22	31	33
Need for changes in faculty attitudes and practice behavior	12	8	23	13	10	5	13	4	7
Need for changes in modes of practice	50	29	37	26	27	32	22	22	36
'Town-gown' relationships	0	5	15	10	9	3	16	6	3
Hospital facilities as constraint on faculty practice	0	3	2	7	6	0	9	3	9
Quality of care	0	1	4	1	4	0	0	1	0

Governance and control									
Practice plan formation and membership	3	4	6	5	12	5	13	8	6
Degree of plan centralization	26	15	21	19	16	24	19	18	21
Practice plan-medical school-university relationships	21	19	27	2	21	13	9	8	19
State control	12	2	2	4	2	11	6	6	4
University-hospital relationships	0	0	6	0	2	0	3	0	1
Faculty-medical school-hospital relationships	12	7	50	8	11	11	6	13	10
Income distribution									
Disparity in income-generation potential among faculty members	12	5	15	26	17	24	0	18	15
Dean's and departmental "taxation" of practice funds	12	4	13	8	11	15	6	7	4
Distribution of practice plan costs and expenses	3	2	0	1	2	0	0	4	4
Limits on practice income	3	5	2	2	7	3	3	4	0
Fringe benefits	0	4	0	0	1	0	0	1	1
Operational matters									
Financial and administrative management	0	5	8	4	2	5	0	8	3
Practice facilities	9	4	6	6	0	5	6	7	10
Billing and collections	3	2	6	8	2	3	9	3	6
Malpractice costs	6	2	2	0	1	3	9	3	3

TABLE 4

Rank Order of Most Frequently Mentioned Issues Concerning Medical School Faculty Clinical Practice by Respondents from 125 U.S. Academic Medical Centers, 1985*

Issues	Vice-Presidents	Deans	Hospital Directors	Department Chairman					Faculty Representatives
				Medicine	Surgery	Pediatrics	Obstetrics/Gynecology	Other	
Financing medical education									
Dependence on practice income to support medical education		5	†	†	2	†	2	2	†
Faculty manpower									
Apportionment of faculty time	2	1	1	1	1	1	1	1	1
Appointment, promotion, and tenure policies	4		4	5	†	4	†	†	†
Recruitment and retention problems					†				
Practice environment									
Threats to patient base and/or future income	1	2	5	2	5	2	3	2	3
Need for changes in faculty attitudes and practice behavior			†						
Need for changes in modes of practice	1	2	3	3	3	3	3	4	2
"Town-gown" relationships			†				†		
Governance and control									
Degree of plan centralization	4	†	†	†	†	4	5	5	4
Practice plan-medical school-university relationships	†	4	5		4				5
Faculty-medical school-hospital relationships			2						
Income Distribution									
Disparity in income-generation potential among faculty members			†	3	†	4		5	†
Dean's and departmental "taxation" of practice funds						†			

* Ranking based on scale of 1 to 5, with 1 = highest frequency of mention.

† Less than fifth in ranking but mentioned by at least 15 percent of respondents within group.

TABLE 5

Responses from 125 U.S. Academic Medical Centers to Question on Whether a Conflict Was Perceived as Developing at Respondent's Institution Between Financial Incentives for Clinical Practice and Academic Mission, 1985

Response	Vice-Presidents		Deans		Hospital Directors		Department Chairmen										Faculty Representatives	
							Medicine		Surgery		Pediatrics		Obstetrics/Gynecology		Other			
	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent	No.	Percent
Yes	12	35	42	46	35	67	54	64	36	44	26	68	16	50	31	43	35	52
No	13	38	34	37	13	25	23	27	34	42	7	18	11	34	27	38	23	34
Not sure	8	23	15	16	3	6	6	7	11	14	5	13	5	16	12	17	9	13
No response	1	3	0	0	1	2	1	1	0	0	0	0	0	0	2	3	0	0

voting their time primarily to research or research and teaching. Assembling a faculty with members assuming different roles was seen as the way in the future for medical schools to preserve a balance among teaching, research, and patient care missions. However, these respondents noted the difficulties in changing appointment, promotion, and tenure policies to acknowledge these different faculty roles. Respondents identified the tenure system as a problem also because tenure makes it difficult for medical schools to replace faculty members whose performance in teaching, research, and/or patient care is unsatisfactory.

Other manpower issues affecting faculty clinical practice mentioned by respondents were problems experienced in the recruitment and retention of faculty members. The perception that private practice may offer greater financial rewards (no sharing of income with the medical school and no limits on income) and the difficulty that excellent clinicians and teachers may have in achieving tenure without a strong program of research were seen as contributing to faculty retention problems. Respondents noted that many full-time clinical faculty members who spend the bulk of their time in patient care have difficulty distinguishing themselves from volunteer faculty members. The lack of time protected by the medical school for teaching and research and the onus of generating most of their salaries through practice has caused disillusionment among these faculty members. Recruitment of certain specialty and subspecialty faculty was reported by some respondents to be a problem because of a limited patient base. Recruitment and retention problems were voiced by the surgery department chairmen more than by any other group.

PRACTICE ENVIRONMENT

A second dominant theme of the narrative comments, in addition to the apportionment of faculty time, was the threats to the patient base needed for teaching and research and/or to future income to the faculties, departments, medical schools, and hospitals posed by the new competitive and reimbursement environment. These threats could be grouped into four broad categories: (*a*) competition with the increased secondary and tertiary care services at community hospitals by community physicians (including alumni), competition with other academic medical centers, and competition with alternative modes of practice, including health maintenance organizations (HMOs) and preferred provider organizations (PPOs); (*b*) changes in federal program reimbursement methodologies and regulation, including cost containment initiatives reflected in limits on reimbursement, physician fee freezes, and diagnosis related groups (DRGs); (*c*) an historical overdependence of the academic medical center on indigent patients, the costs of whom are difficult to shift in the new environment to paying patients; and (*d*) changing practice patterns, including decreasing hospitalization rates and decreasing lengths of stay.

Although many respondents simply voiced these threats as issues, others noted specific actions needed to compete successfully in the new practice environment, both in terms of changes in faculty attitudes and behavior and changes in modes of practice. The former category included the need for faculty members to compete much more aggressively in attracting patients to the practice and the hospital by improving relations with patients and referring physicians and by marketing services. Also voiced was the need for faculty members to practice more efficiently and to pay greater attention to cost containment. The hospital directors made these suggestions more frequently than any other group.

The changes in practice modes seen by the respondents as necessary to compete successfully in the new environment fell into several related areas pertaining to the degree and nature of involvement in prepaid and brokered systems of care and the degree of involvement in primary care and in ambulatory care. These changes were often discussed in the context of two overriding concerns: (*a*) the current organization of faculty practices and (*b*) the effects of changing modes of practice on student and resident training.

Comments on the issues surrounding HMO/PPO development focused on whether or not the school and/or the hospital should develop its own HMO or PPO network (a small number reportedly were moving in this direction) or become part of a referral system of existing networks. Although academic medical centers have traditionally viewed their special role as providing secondary and tertiary level services, the new practice environment has raised the question of whether more involvement in primary care is required to maintain referral systems. Comments ranged from the description of specific initiatives—for example, the development of satellite clinics in the community both adjacent to the medical center and in surrounding suburban areas—to expressions of support for retaining and improving the academic medical center's niche as an unique tertiary care site offering the best of new research and technology. The shift in medical care from inpatient to outpatient settings requires the academic medical center to decide whether or not to become more involved in ambulatory care. Those commenting on this issue fully agreed on the need to develop and enhance ambulatory care delivery as a way of adapting to changing practice patterns, although the low financial return of these operations, the excessive time required of physicians, and other inefficiencies were noted as potential sources of difficulties. Concerns about the effect of these changes on the education of medical students and residents centered particularly on the problems associated with teaching in the ambulatory care setting.

A relatively frequent theme in the responses was the admission that faculty practice organizations are not structured to provide the integrated system of care necessary to compete in the new practice environment. This issue is closely tied to one under the heading of practice plan centralization (discussed below) but reflects more than simply the membership and income distribution policies mandated by centrally organized plans. To compete, the respondents believed that faculty practices must be reorganized into "true group practices," with coordinated management of patients, internal referral systems, and mechanisms to negotiate as a group with HMOs and PPOs for brokered care.

Increased "town-gown" tensions appear to be a consequence of the academic medical center's response to the new practice environment, according to some respondents. The intrusion of the medical school into service areas formerly the domain of community physicians was seen as interfering with traditional consultant-referral relationships between the medical center and the community. At a few schools (chiefly the community-based schools) the increased tensions with community physicians, many of whom were volunteer faculty members, had resulted in threats by the latter to withdraw their teaching support, a condition one respondent described as "teachus interruptus."

A small number of comments had to do with the constraints imposed by hospital facilities in responding to the new practice environment. These comments were primarily related to the adequacy of the hospital both in the numbers of beds available and in the restricted nature of services provided.

A final set of issues dealt with the effects of the new practice environment on quality of care; these included the growing emphasis on cost reflected in the DRG reimbursement system, other cost containment efforts, and the competition for patients.

GOVERNANCE AND CONTROL

One set of issues involving governance and control of clinical practice involved forming practice plans and establishing or modifying membership requirements. A few schools were in the process of developing organized structures for faculty practice because they were either new or had had a tradition of allowing independent practices. Other schools had departments or faculty members which, for a variety of reasons, had not been incorporated into a practice plan structure, a situation viewed as requiring change. Membership issues included the question of whether or not volunteer faculty members should become part of the plan and contribute to the institutional development fund. The surgery chairmen, who expressed problems in the loss of full-time faculty members to the volunteer ranks, raised this as an issue more frequently than the other groups.

The degree of plan centralization was another topic in the governance and control area. Those expressing the need to increase centralization of control argued that current departmental or group autonomy inhibited a coherent and effective response to problems brought on by the new competitive and reimbursement environment and that opportunities and institutional interests were lost amid faculty pursuits of individual or departmental advantage. Those emphasizing a need for greater decentralization of control said that centralized control had dampened individual or departmental initiative and that decision-making about practice matters were best vested in those working closest to the problems. Those vice-presidents, deans, and hospital directors who offered an opinion on plan centralization were unanimously in support of greater centralization. The medicine, surgery, and "other" department chairmen who commented tended to be divided in their opinions.

The relationship between the practice plan and the medical school or the university was another area of interest expressed by the respondents. The comments focused on the need for greater separation from university control and concerns about a movement away from medical school control. Several noted the growing resentment of faculty members toward the prospect of increased university control and fears that plan funds might be appropriated by the university for nonmedical school purposes. The legal organization of the plan in relation to the medical school or university was also cited as an issue. Separate incorporation was recommended by respondents from each group, but primarily as a way to avoid university or state control. Informal medical school control was not an issue among the respondents. On the contrary, it was generally well supported. In fact, the fear that the medical school was losing control of the practice plan and practice activities was the chief point of two other sets of comments. The first dealt with fears that the practice plan was becoming a third force beyond the medical school and the hospital, a force that, for example, was developing entrepreneurial activities not in accord with academic interests. The second set of comments emphasized that the practice entities as currently constituted were not adequately accountable financially to the medical school.

State control was a relatively infrequent concern of the respondents. However, the vehemence of the few responses on this issue equaled that of responses on any issue. The respondents raised two general issues concerning state control. One was that the current level of state regulations and bureaucracy imposed on the medical school and the faculty was limiting the medical school's ability to shape practice plans in a way consonant with the missions of teaching, research, and patient care. The second related to concerns that the state, by offsetting its contribution to the medical school by the amount of practice earnings, diminished initiative and produced fears that it might appropriate practice funds to a greater degree in the future for nonacademic purposes.

A few chairmen and hospital directors commented on the relationship between the university and the hospital. These invariably focused on the need for greater separation of the two institutions. The bureaucratic procedures of the university were seen as impeding the hospital's efforts to be responsive to the changing practice environment and to improve services.

Finally, the relationship between the faculty or medical school and the hospital was the focus of issues raised often by hospital directors, by whom it was ranked second in frequency of mention among all issues. The issues on this relationship could be grouped into four general subsets. The first covered problems in determining appropriate cost-sharing, in terms of support of departments and faculty members, purchase of high technology equipment, losses incurred in providing indigent care, and development of ambulatory care facilities and other joint clinical enterprises. The second set of issues pertained to control. Some faculty members noted instances where the affiliation agreement gave, in their view, too much control to the hospital and expressed a desire for more input into hospital administration. The hospital directors, on the other hand, saw a need to have more participation in faculty recruitment and appointments. The third set of issues focused on the development of cooperative practice relationships, the potential and growing competition between the faculty practice plan and the hospital, and the need for more joint faculty-hospital ventures. The hospital directors felt that faculty members needed to become better "citizens" of the hospital and to have increased responsibility to it. The fourth but less frequently mentioned problem area in faculty-hospital relationships were issues related to access privileges (that is, closed versus open staff) and current policies favoring full-time faculty members in the use of hospital resources.

To a specific question addressed only to hospital directors, 20 of the 52 (38 percent) responding reported that they were participating in joint ventures with the faculty practice plan, while another four (8 percent) stated that such ventures were currently being discussed. The joint ventures include HMO and PPO development, joint negotiations on HMO and PPO contracts, diagnostic imaging centers, ambulatory care facilities (including primary care satellite offices and outpatient surgery centers), home health care programs, joint marketing programs, shared purchasing arrangements, and information and billing-collection systems.

INCOME DISTRIBUTION

Issues concerning the distribution of practice income primarily focused on the disparity among faculty members in their potential for generating income—between basic science and clinical departments, between procedurally oriented and cognitively oriented clinical departments, and among specialists within departments. The chairmen of medicine, pediatrics, and "other" departments commented on this issue more frequently than did the other groups. A result of the disparity, produced by historical reimbursement policies, is that some departments are subsidized by the earnings of others—a situation that produces tensions. Those stating specific views were divided between advocates for greater sharing of the income and those who resented the current cross-subsidization. Medicine and pediatrics chairmen advocated the former position, while surgery chairmen supported the latter. A closely related set of issues dealt with the level of "taxation" instituted by the dean and department chairmen on faculty practice to support educational programs. These comments were also divided between those who felt the level was insufficient and those who felt it was too high. Medicine and pediatrics chairmen supported larger contributions, while surgery chairmen were divided.

Another aspect of the distribution formula mentioned was the way practice plan costs and expenses were distributed among the departments and across institutions and organizations within the medical center. Some respondents suggested there was a lack of equity across departments in the formula; others reported that the university was inadequately reimbursed by the practice plan for the use of facilities. Two other infrequently mentioned issues dealt with the limits on practice income and the fringe benefits afforded by the plan. Some respondents felt that the limitations on income were set too low at their institution and needed to be raised. Others argued for a more restrictive policy. A frequent comment with regard to fringe benefits was the need to alter them to take advantage of tax-deferred income plans.

OPERATIONS

The final set of issues concerned operational matters specific to different settings. Comments were made that financial and administrative management support of faculty practice needed to be improved and overhead expenses reduced to make the practice plan more competitive with community physicians. Practice facilities were also cited as too costly, inadequate, underdeveloped, lacking geographic consolidation for effective practice, or providing an unattractive environment for patients. Billing and collection issues focused on centralized versus decentralized billing systems and the need for improved billing and collection procedures. Finally, the increasing costs of malpractice insurance were noted as an issue, primarily by respondents from schools in New York state.

Conclusion

The response rate of the deans (73 percent), the number of issues identified by the hospital directors, and the intensity of the views expressed by the department chairmen in their comments all illustrate the significance of faculty clinical practice to the academic medical center leadership. It is clear that the increasing dependence medical schools have on practice income is creating fears that the academic mission is being diverted. It is also clear that the rules of medical practice and health care delivery are changing rapidly in a way that, without vigorous responses on the part of academic medical centers to maintain their patient bases and practice income, the academic mission may not be served.

A search appears to be underway for institutional strategies, policies, and organizational structures that will permit effective functioning in the new environment. As indicated by survey responses, preserving a balance among teaching, research, and patient care missions is of primary concern and requires changes in the conception of faculty roles, responsibilities, and reward systems in the views of many respondents. The number of comments on threats to the patient base and service income from competition and new reimbursement methodologies is a hopeful note in that these potential problems are at least being recognized. It is clear—at least to some of the respondents—that several changes in modes of practice are needed. The first is to develop faculty clinical practices into a "true group practice," a multidisciplinary practice organization characterized by coordinated patient management, internal referral systems, and mechanisms to negotiate as a group with HMOs and PPOs for brokered care. The second change, emphasized by hospital directors, calls for faculties and hospitals to develop more collaborative strategies in health care delivery. Both changes respond to purchasers' demands for coordinated rather than autonomous systems of care. Buyers are no longer interested in seeking separately physician services or hospital services but rather the guaranteed availability of necessary medical services at a predetermined fixed price.

There is a fear that, in a scramble for personal advantage in the new practice environment, the goals of the academic medical center and the unique missions of its member institutions may be diverted. Effecting these changes in the academic medical center may require more than ever before that individuals, groups, and institutions within the academic medical center transcend parochial interests. Some autonomy may need to be sacrificed in order that the enterprise as a whole survive and flourish.

In response to the survey results, the AAMC formed an ad hoc Committee on Faculty Practice in June 1985, with representation from vice-presidents, deans, teaching hospital directors, department chairmen, faculty representatives, and practice plan administrators. The issues most frequently identified in the survey consititute the agenda for the committee's discussions. The committee is charged with identifying projects and programs for the AAMC to develop that will assist its member institutions in responding to the issues raised in the survey.

Clinical Competencies Of Graduating Medical Students

Yvette M. Martin, Dona L. Harris, Ph.D., and Miki B. Karg

Abstract—In a survey conducted by the authors, the goals of medical school curricula regarding the clinical competencies of graduating students were explored. Inventories listing 83 clinical skills were sent to 123 U.S. medical schools and to 462 volunteer clinical faculty members at the University of Utah School of Medicine. The responding medical schools singled out 43 clinical skills as definite goals of their curricula, and the practicing physicians identified 49 clinical skills in which graduating medical students should be competent. The study provided an easy mechanism to compare the clinical expectations of practicing physicians and of medical schools regarding medical students.

Medical education is usually considered a continuum of several overlapping processes. The first part involves mastery of the academic foundation (the science); the second involves mastery of the mechanics (the skills); and the final process involves the integration of the first two parts and the mastery of the "art" of practicing medicine. Much time and research have been devoted to the first and third portions of medical education; however, an extensive literature search by the authors provided little information on the actual mechanics of practicing medicine in terms of what a graduate should be able to do following four years of medical school.

Since graduating medical students will enter residency programs for specialty training, medical schools have the task of providing a general medical education, a basis on which the graduates can build. The report of the Project Panel on the General Professional Education of the Physician (GPEP) and College Preparation for Medicine addressed this issue when it stated that "all physicians, regardless of specialty, require a common foundation of knowledge, skills, values, and attitudes" (1).

The problems associated with evaluating clinical skills have been studied (2) and medical educators' expectations for medical students vary, depending upon the level of education of the students. Obviously, a medical student is not expected to be competent in all areas in which competency is expected of residents, and the level of competency of first-year residents is not equal to that of senior residents.

Although medical schools are designed to begin the medical education process,

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the end product of that process has never been critically defined. Because of the lack of specific information on the skills and competencies of medical school graduates, the authors undertook a study to address the following questions: What expectations do medical schools have of their graduating students in terms of skills and competencies? What expectations do practicing physicians have of graduating medical students in terms of their clinical skills and competencies?

Methods

A list of 83 clinical skills was sent by the authors in 1983 to 123 U.S. medical schools and a sample of practicing primary care physicians. The questionnaire used was adapted from one developed in 1975 by the Primary Care Preceptorship Advisory Committee of the University of Utah School of Medicine and is currently used to measure clinical skills of students following preceptorships (3). The advisory committee had reviewed a list of basic clinical and practical skills submitted by medical school faculty members and voluntary preceptors. Committee members reviewed these skills to determine whether they were realistic and agreed on 83 clinical skills. The committee membership represented the areas of family practice, internal medicine, surgery, and pediatrics. The committee also included preceptors and medical students.

The survey asked respondents to rank each clinical skill on a scale from 1 to 5. A rank of 5 indicated that all graduating medical students should be able to perform that skill independently, and a 1 indicated that a graduate should not be expected to perform that skill. The respondent from each medical school was asked to circle the number that best described the goals of his medical school curriculum in terms of student competency. The questionnaire was sent to the dean of the medical school with the request that the survey be forwarded to the appropriate person(s) (for example, director of medical education and/or academic deans). Volunteer faculty members from the departments of family and community medicine, pediatrics, and internal medicine at the University of Utah School of Medicine were asked to indicate their personal expectations of the skill levels for graduating medical students. The volunteer clinical faculty members were selected because they were full-time practicing physicians who, as preceptors, trained clinical students in their private offices.

The median and mean scores were computed for each clinical skill, with the responses of the medical schools and the practicing physicians being considered separately. A mean score of 3.75 or greater was considered to be a strong indication that graduating students should be competent in that particular skill and is referred to as a positive reply. A mean score of 2.25 or less was considered to be a strong indication that graduating students were not expected to be competent in this particular skill and was considered a negative reply. The mean scores that fell between 2.25 and 3.75 were not considered strong indications for or against that particular skill and are referred to as neutral replies. The data reported are based on the mean scores.

Responses were received from 74 medical schools for a response rate of 60 percent. Inventories were sent to 462 volunteer clinical faculty members, and responses were received from 234 for a response rate of 51 percent.

The Wilcoxon rank sum test was used to test for differences between the responses of the physicians and the medical schools for each clinical skill. Significance was determined at the $p = .01$ level.

The clinical skills were grouped into seven major categories: general psychosocial, problem management, general physical (adult), general physical (pediatrics), general physical (surgery), general physical (obstetrics/gynecology), and office management.

Results

From the medical schools, positive scores were obtained on 43 of the 83 skills inventoried. Only 16 of the 83 skills were not considered to be goals, and 24 of the 83 skills were scored as neutral replies by the schools. Examples of all three categories are shown in Table 1.*

The responses from the practicing physicians were similar. Practicing physicians expected a graduating medical student to be competent in 49 of the 83 clinical skills. Negative responses were scored on nine of the 83 skills, and 25 clinical skills were neutral.

Disagreements on positive, negative, and neutral responses were found between the medical school respondents and the physicians on 15 of the 83 clinical skills. The differences in scores were statistically significant using the Wilcoxon rank sum test ($p = .01$) in nine clinical skills. These skills were: billing patients and insurance companies; managing a breech delivery; staffing a practice; applying obstetrical forceps; performing a dilatation and curetage, an episiotomy, an infant circumcision, and a sigmoidoscopic examination; and deciding whether a 10-year-old needs a tonsillectomy and adenoidectomy. On none of the 15 skills was one response positive and the other response negative; one response was always neutral, and the other response was either positive or negative. For example, the clinical skill of performing a sigmoidoscopic examination received a positive reply (mean = 3.765) from the physicians and a neutral reply (mean = 2.900) from the medical schools.

The rankings of the clinical skills as positive, negative, or neutral were consistent between the preceptor and medical school groups for 68 skills. Of these 68 skills, 42 received positive responses, nine received negative responses, and 17 received neutral responses. Neither group of respondents believed students should be competent in many of the skills in the category of general physical skills (surgery), and only five of 19 such skills received positive responses. Eleven of the 17 skills that were scored as neutral were found in two categories, general physical skills (surgery) and office management. It appears that both groups believed surgery should not be an area of major emphasis at the undergraduate level. In fact, seven of the nine skills receiving negative responses were in surgery.

Two clinical skills were completely agreed on by the medical schools (mean = 5.00, standard deviation = 0.000): taking a history and performing a complete physical examination on an adult. The practicing physicians did not completely agree on any given clinical skill, yet these two skills (mean = 4.9) were among the six clinical skills with the smallest standard deviation among the physicians' responses. The other four skills were performing a rectal examination and a complete breast examination and taking a gonococcus culture and a Pap smear (all with a mean of 4.8 or 4.9). The other skills with the smallest standard deviation from the medical schools' responses were: performing hypnosis (mean = 1.2), per-

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* A complete list of the clinical skills inventoried and the mean response received from medical schools and physicians can be obtained from the second author.

TABLE 1

Mean Ratings of Selected Clinical Skills by 74 U.S. Medical School Respondents and 234 University of Utah School of Medicine Preceptors, 1983

Skill	Rating*	
	Schools	Preceptors
General psychosocial		
Take a history	5.000	4.958
Perform hypnosis	1.171	1.660
Counsel mother with enuretic child	3.714	3.651
Counsel preoperative patient	4.420	4.277
General physical (adult)		
Perform adult examination	5.000	4.958
Perform rectal examination	4.986	4.949
Perform sigmoidoscopic examination	2.900	3.765
Perform cardiopulmonary resuscitation	4.871	4.812
Perform thoracentesis	3.186	3.610
Problem management		
Interpret electrocardiogram	4.059	3.939
Interpret standard chest X-ray	4.358	4.178
Interpret laboratory results	4.676	4.679
General physical (pediatrics)		
Check hips on newborn	4.735	4.594
Resuscitate a newborn	3.582	3.966
Interpret growth charts	4.618	4.401
Diagnose and manage acute otitis media	4.677	4.671
General physical (surgery)		
Administer general anesthesia	1.783	1.814
Perform endotracheal intubation	3.358	3.435
Reduce simple fracture	2.471	3.123
Interpret acute abdomen	4.271	4.202
Interpret results of paracentesis	4.132	3.981
General physical (obstetrics/gynecology)		
Perform pelvic examination	4.943	4.821
Take Pap smear	4.929	4.896
Perform complete breast examination	4.929	4.854
Perform episiotomy	3.271	3.761
Manage routine delivery	4.129	4.152
Office management		
Schedule appointments	2.441	3.425
Teach patients general health care	4.209	4.514
Know when to refer	4.439	4.616

* Skills rated on a scale of 1 to 5, with 5 = all medical students should perform this skill independently upon graduation and 1 = students are not expected to perform this skill. A skill that received a mean of 3.75 or greater was interpreted as a goal of U.S. medical schools, while a mean of 2.25 or less indicated that this skill was not a goal of U.S. medical schools; any skill with a mean score between 2.25 and 3.75 was considered a neutral response.

forming a sigmoidoscopic examination (mean = 2.9), and performing a complete breast examination and pelvic examination (means = 2.9).

In another study (3), the self-perceived competencies of preceptorship students were compared with those of students who had not participated in a preceptorship. In that study, the preceptorship students generally felt more competent in performing most of the skills. In only two areas, performing hypnosis and performing endotracheal intubation, were the results significantly higher (Wilcoxon rank sum test, $p = .05$) for the nonpreceptorship students. In the present study, both the physicians and the medical schools assigned negative or neutral scores to these two skills.

Discussion

The study reported here addressed the common clinical goals of the nation's medical schools. Although some variation is to be expected from medical school to medical school, a common basic core must exist if the graduates are expected to compete and work with each other. This study also provides an easy mechanism for a medical school to compare its expectations for medical school graduates with those of practicing physicians and of other medical schools.

Medical students are exposed to a vast number of skills and procedures while in school. The research reported here showed that some of these skills and procedures should be mastered while in medical school, because graduates will be expected to perform certain of these clinical skills independently. However, there are also areas that do not need to be mastered, even though a student may have been exposed to them.

Understandably, some uncertainty exists even among medical students concerning their competency upon graduation. This uncertainty could be lessened if the students had a clearer understanding of the clinical expectations of their school, of other medical schools, and of practicing physicians. The GPEP panel dealt with clinical education and made specific recommendations in its final report with regard to improving that experience for medical students (1). It stated: "Medical faculties should specify the clinical knowledge, skills, values, and attitudes that students should develop and acquire during their general professional education." The present study offers a list of core clinical skills that medical schools can justifiably require their students to have on graduation.

Physicians acting as preceptors can also benefit from the findings of the study. A list of minimum clinical expectations can serve as a guide for interactions with medical students. In no way should expectations limit the students' education, because no upper bound is given in the study. It should always be possible for the student to exceed the expectations of physicians and schools yet to have a common point from which the student and the teacher can begin to work.

Further research might explore the expectations of medical students as they approach graduation. Are their expectations regarding what will be expected of them realistic compared with those of practicing physicians and the medical schools? More important, are medical schools conveying to their students the skills they are expected to develop?

Also, the correlation between a student's self-evaluation and his actual competency in clinical areas needs to be established. The difficulty ~~in~~ doing this is due to the absence of any reliable method to test students' competency in performing clinical skills (4). There is some question about validity of a written examination to evaluate a student's ability to perform a procedure.

The authors had difficulty obtaining from medical schools the clinical goals of their curricula. Of concern, therefore, is the possibility that this information is not readily available to faculty members, the preceptors associated with the medical schools, or to those it affects the most, the medical students.

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COMMUNICATIONS

Changes in Death Education In U.S. Medical Schools During 1975–1985

George E. Dickinson, Ph.D.

Physicians often have not been taught how to ease the psychological distress of the dying (1). Because physicians deal with dying patients as a central aspect of practicing their profession, medical schools should stress communication skills with dying patients. A survey of 1,093 physicians (2) revealed that medical students who completed a course devoted exclusively to relating to dying patients were better able to deal with those patients and their families than medical students who did not take such a course.

Traditionally, medical education has offered only limited assistance to the medical student encountering death for the first time. A possible approach to improving physicians' skills in treating the dying would be courses on the social and psychological aspects of dying in medical school curricula (3). The objective of the research described in this paper was to examine such medical school courses during 1975 to 1985.

Methods and Results

A brief questionnaire was mailed by the author to all medical schools in the United States in 1975 (4), 1980 (5), and 1985 (113, 128, and 126 schools respectively). Two follow-up mailings were sent to those who did not respond. A total of 107, 123, and 113 questionnaires were returned (95, 96, and 90 percent respectively). The information sought through the questionnaire included the type of course on death and dying offered, number of years the course had been offered, percentage of students taking the courses, general format of the courses, professional background of instructor(s), and required readings.

From 1975 to 1985 the number of medical school courses in death education increased slightly. The number of full-term courses increased from 7 in 1975 to 16 in 1980 but dropped to 14 in 1985. The number of occasional lectures and short courses on death and dying, often integrated into other courses, hardly changed over the decade; 80 percent of the schools offered them in 1975 and 1980 and 82 percent in 1985. Medical schools offering no formal death education courses decreased from 14 in 1975 to 10 in 1980 to 6 in 1985.

In the 1985 survey, the average number of years courses had been offered was 8.06, and 74 percent of the schools had introduced death education within the past decade. Little change occurred in the percentage of schools in which at least 50 percent of the students took the death-education offering (71 percent in 1975, 74 percent in 1980, and 75 percent in 1985).

A team approach to teaching death education was used by a majority of medical schools over the decade (59 percent in 1975, 64 percent in 1980, and 62 percent in 1985). Physicians taught the courses less often in 1985 than in 1975, while psychiatrists were more often involved (Table 1). Although theologians, psychologists, and sociologists still taught death and dying, their importance decreased during the decade. Nurses, philosophers, social workers, and attorneys were increasingly involved in teaching the courses.

The most frequent format for teaching death education continued to be a combination of lecture and discussion; the seminar approach was least used. Both journal articles

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TABLE 1

Percentages of U.S. Medical Schools with Death Education Instructors with Nine Types of Professional Background, 1975–1985

Background*	1975 (n = 93)	1980 (n = 113)	1985 (n = 106)
Physician†	85	71	58
Theologian	46	40	31
Psychologist	37	33	25
Sociologist	26	18	14
Psychiatrist	13	55	59
Nurse	8	17	19
Philosopher	5	19	29
Social worker	4	14	23
Attorney	2	10	10

*Other educational areas represented by instructors in 1985 were bioethics, medical history, genetics counseling, literature, mortuary science, public health, and physical therapy.

† Includes all specialists except psychiatrists.

and books were required readings; and films, videotapes, and conferences with terminally ill patients were included in many courses.

Conclusions

During the past decade there has been an increased emphasis on formal death education in U.S. medical schools. Perhaps medical school administrators are recognizing that "on-the-job training" with terminally ill patients is less beneficial for the students and the dying patient than formal death education during medical school. Hopefully this increased emphasis on medical students learning to deal with death and acquiring communication skills for dealing with terminally ill patients and their families will produce better working relations between physicians and dying patients. Helping students face their anxieties about dying and death at the time they are first faced with dying patients would seem to be the appropriate time for death education.

The multidisciplinary approach to death education in U.S. medical schools should reinforce the view of death as a normal aspect of the life cycle. The use of instructors from outside the medical profession seems to reflect a genuine desire by medical educators to consider the dying patients' needs and to handle ethical issues. The inclusion of a humanistic emphasis in death education should help both the dying patients and the student.

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Severity of Illness and the Teaching Hospital

Richard A. Berman, Jesse Green, Ph.D.,
David Kwo, Keith F. Safian, and Lee Botnick

Abstract—In the current environment of cost containment pressures on health care providers, teaching hospitals are facing increased financial risks that could jeopardize their special role in the health care delivery system. One of these risks is that the Medicare prospective payment system does not adequately account for severity of illness. Whether teaching hospitals treat a case mix of patients with more severe illness than do nonteaching hospitals was tested in the study reported here using two severity measures, Horn's severity of illness index and Gonnella's "disease staging." Teaching hospitals were found to treat a significantly greater proportion of severely ill patients than community hospitals, especially when measured by the severity of illness index. Differences in case mix of severity of illness among hospitals can have a significant impact on patient care costs, which may not be adequately met by a reimbursement system based on diagnosis related groups. Hospital managers can use severity of illness measures to assess the resource needs of patients and the practice patterns of physicians. If severity of illness measures help describe the special burden of treatment that teaching hospitals bear, they should be used to establish the case for adequate financial support.

Many studies have concluded that the average cost of treating a patient in a teaching hospital is significantly greater than in a community hospital (1). In the past, society has been willing to support this cost difference in order to train the next generation of physicians, expand the pool of medical knowledge, develop new medical technology, and provide quality health care to the poor. Now, with an ever increasing emphasis on containing the cost of health care, providers are under intensifying pressures to reduce prices to consumers, third-party payers, and business. These pressures have resulted in increased competition among providers for patients and in new reimbursement methods designed to create incentives for hospitals to use fewer resources per patient. With so much emphasis on cost reduction, there is concern that teaching hospitals, despite the important contributions they make to health care and edu-

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cation, may lose the financial support they ~~have traditi~~onally had.

The prospective payment system (PPS), enacted by Congress in 1983 for the Medicare program, defines hospital output in terms of 470 diagnosis related groups (DRGs). Each DRG has a cost weight or reimbursement rate that is intended to reflect the relative intensity of treatment necessary for patients in that DRG. Payment per case, then, is directly based on the cost weight of the patient's assigned DRG.

Under the PPS, the DRG cost weights are the sole basis for comparing the case mix of different institutions. Yet, these weights have been criticized as being based on inadequate data from too few cases and as being outdated (2). In addition, the cost weight for each DRG was derived by using a single ratio of costs to charges for all hospitals, regardless of experiences at individual hospitals. If it is true that teaching hospitals have underpriced their specialized and high-cost services (for example, immunopathology) and overpriced their routine services (for example, normal maternal delivery), the DRGs requiring the most intensive treatment would not be fully reimbursed. Thus, the DRG system penalizes teaching hospitals.

Perhaps the most important criticism of the PPS system by teaching hospitals is that severity of illness is not adequately reflected by the DRGs. This view is based in part on the wide variation in resource use within DRGs, even within institutions with the same physician attending. As part of a study of the homogeneity of the DRG categories, the authors of the present study examined a sample of 12,136 cases at the New York University (NYU) Medical Center in 1984 and found very high coefficients of variation in resource use within many DRGs. To the extent that such variation is due to differences in severity of illness within a DRG, it may be impossible for a hospital to conform to the average resource use established for that DRG.

Teaching hospitals offer many services that could be expected to attract more severely ill patients than community hospitals. Certainly, teaching hospital managers and physicians share a widespread belief that they treat sicker patients. In the study reported here, the authors attempted to clarify what is meant by severity of illness and to test the hypothesis that teaching hospitals treat a higher proportion of severe cases as determined by standards other then DRGs. Measures of severity of illness offer hospital managers an important tool for resource planning and control.

There is no general agreement on how severity of illness should be defined, and there are at least three views of what this definition could be. One approach is a system that categorizes patients in a way that maximizes homogeneity within groups with respect to the nature of their illness. Such a system examines the underlying condition of the patient, regardless of the degree of intervention. A second alternative is a classification system that not only considers the patient's condition but also accounts for the degree of intervention and the patient's response. A third option, as yet undeveloped, would be a system that measures severity of illness against an ideal amount of intervention for a specific disease rather than against actual averages for that disease.

Method

For the study reported here, patients were classified using two well documented methods: "disease staging," developed by Gonnella and colleagues (3), and the severity of illness index, developed by Horn at the Johns Hopkins University School of Public Health (4, 5). Disease staging represents a system that examines patient condition regardless of the degree of intervention, and the severity of illness index represents a system that accounts for the degree of intervention applied and the patient response.

Disease staging measures the severity of specific, well defined diseases, using coded criteria for 420 diagnoses. Gonnella and associates borrowed from clinical medicine (specifically oncology) the concept that during the course of a disease certain well delineated stages can be defined and detected clinically. These stages reflect the severity of the disease in terms of risk of death or residual impairment and have clinical significance for prognosis and choice of therapy (3). Disease staging criteria were developed for manual application to medical records and for software packages that utilize abstracts from computerized hospital discharge data.

In disease staging, diseases are categorized into four levels, each increasing in severity. Staging is independent of any expected response to therapy or of resources used. According to Gonnella, the system "is based on a conceptual model of the disease process itself rather than on the relative efficacy of medical technology" (3).

In the computerized version of disease staging, principal and secondary diagnoses are automatically selected by the computer programs. In view of the availability of computer systems to expedite processing, this version is less costly to apply to large data bases than the manual system.

Perhaps the greatest problem with the staging methodology is the fact that it examines each disease separately but does not link diseases to look at the total impact on the patient. That is, when the staging system is applied to a patient, only the principal identified condition is used in the severity measure, and other, secondary conditions unrelated to the principal illness are not reflected. Also, staging categories have not been developed for all diseases. For example, the diseases that have not been categorized comprised 15.6 per cent of the NYU Medical Center's hospital discharges, based on a two-month sample of 2,000 patients studied by the authors in 1984 during a study of disease staging of the medical center's patients.

Horn's severity of illness index (4, 5) was developed by a team of researchers, physicians, and nurses. It is a generic (not disease-specific), four-level index determined from the values of seven criteria related to "burden of illness." The four levels range from minor (level 1) to catastrophic (level 4). The seven criteria are: (*a*) stage of the principal diagnosis, (*b*) complications of the principal condition, (*c*) concurrent interacting conditions that affect the patient's health status, (*d*) patient's dependency on hospital staff, (*e*) extent of nonoperating room life-support procedures, (*f*) rate of response to therapy or rate of recovery, and (*g*) impairment remaining after therapy for the acute aspect of the disease.

To determine the severity of illness rating for each case, a medical records rater analyzes the patient chart after discharge. The rater first assesses the pattern of the seven criteria; then, based on evaluation of how each contributes to the hospitalization, the rater identifies a severity level for the admission. Horn's studies have shown that, of the seven criteria used to form an overall severity score, three of the criteria (complications, interactions, and rate of response to therapy) contribute more to overall severity level than the others.

The severity of illness index can be used for all categories of inpatients except psychiatric patients (4, 5). The seven criteria permit the index to be applied to multiple diagnoses, thus accommodating a significant percentage of the patient population in teaching hospitals where patients often have more than one diagnosis at the same time. The severity of illness system is expensive to use because it is not computerized and because retrospective chart reviews by trained raters is time and resource intensive.

To study disease staging for the present study, the authors analyzed 1.3 million hospital discharges in 1983 in the New York City area. Each patient discharge record was assigned a stage using the disease staging system. The computer processing and data collection were performed by a consulting firm based in New York City. Cases that could not be assigned a stage (because staging has not been developed for all diseases) were omitted from the sample. The sample was divided into teaching and nonteaching hospital cases, using membership in the Council of Teaching Hospitals (COTH) of the Association of American Medical Colleges as the criterion for determining the teaching hospitals. By this criterion, there were 49 teaching and 64 nonteaching hospitals in the sample.

Because the severity of illness index is not a computerized method, the same data base used for disease staging could not be examined using the index. Instead a sample of 54,000 discharge records from 13 hospitals throughout the country was used. All of these hospitals had trained raters who assigned the severity of illness ratings. Of the hospitals in the sample, 11 were teaching hospitals and two were nonteaching. Although a larger sample was preferable, no other hospitals used the severity of illness system.

To assess the financial impact of differences in the severity of patient illnesses, the authors analyzed 9,233 NYU Medical Center discharges over the six-month period from April to September 1984. Each discharge was assigned a severity of illness index rating. For this aspect of the study, deaths were omitted, and charges and average length of stay were used as measures of resource consumption. To compare severity levels within DRGs, the authors studied 1,115 of these cases in 15 DRGs. Each of the 15 selected DRGs had more than 30 cases and three or more cases in at least three severity levels.

Results and Discussion

Table 1 presents the distribution of cases by severity and hospital type for disease staging and the severity of illness index. A chi-square test was used to determine whether the distribution of cases by severity level differed between the two types of hospitals. The results indicated that the overall distribution of severity was significantly different between teaching and nonteaching hospitals measured by both instruments. The disease staging method had a chi-square of 645.7 ($df = 4$, $p = .0001$); the severity of illness index had a chi-square of 1570.7 ($df = 3$, $p = .0001$).

The overall distribution of severity using disease staging differed significantly between the two types of hospitals. These differences were due to the slightly higher proportion of stage 3 cases and the lower proportion of stage 1 cases in the teaching hospitals. Although the differences were statistically significant, they were not dramatic. For instance, stage 1 patients in the nonteaching hospitals were only 1.3 percentage points more than in the teaching hospitals.

It is important to note that disease stag-

TABLE 1

Percentage of Cases at Each Level of Severity, as Measured by Disease Staging Method and Severity of Illness Index, at Selected Teaching and Nonteaching Hospitals, 1983–1984

Measurement	Teaching Hospitals†		Nonteaching Hospitals†	
	No. of Cases	Percentage	No. of Cases	Percentage
Severity of Illness Index*				
Level 1	26,630	58.7	8,966	78.5
Level 2	14,888	32.8	2,091	18.3
Level 3	2,373	5.2	244	2.1
Level 4	1,500	3.3	117	1.0
Total	45,393	100.0	11,418	100.0
Disease Staging Method‡				
Stage 1	300,498	56.5	317,151	57.8
Stage 2	108,069	20.3	114,356	20.8
Stage 3	89,519	16.8	82,763	15.1
Stage 4	33,840	6.4	34,483	6.4
Total	531,296	100.0	548,753	100.0

* Severity of illness index levels range from minimum severity (level 1) to catastrophic (level 4).

† In application of the severity of illness index, the number of teaching hospitals in the sample was 11, and the number of nonteaching hospitals was two; these hospitals were located throughout the country. In application of disease staging, the number of teaching hospitals was 49, and the number of nonteaching hospitals was 64; all of these hospitals were located in the New York City area.

‡ Disease staging levels range from no complications or minimal severity (stage 1) to death (stage 4).

ing is a disease-specific measure, yet the comparisons reported here were among the stages regardless of disease. A follow-up study is being done by the authors to compare the stage distribution within diseases between teaching and nonteaching hospitals.

The severity of illness index showed striking differences between the teaching and nonteaching hospitals. The teaching hospitals had a far larger share of level 2, 3, and 4 cases than the nonteaching hospitals. In levels 3 and 4 combined, the teaching hospitals had more than twice the number of cases (proportionally) than the nonteaching hospitals had. In evaluating these data, however, it must be remembered that the sample size of nonteaching hospitals was small.

The findings tend to confirm that teaching hospitals treat a case load with more severe cases than do nonteaching hospitals. Some limitations to the study should be noted, however. The disease staging sample was drawn only from New York City area hospitals, where nonteaching innercity hospitals may attract more severe cases than their counterparts nationally. Also, although the assignment of a disease stage is based on a particular disease, the study compares the stage distribution between hospitals, while the disease mix is not accounted for. The severity of illness index sample needs to be expanded to include a greater representation of nonteaching hospitals. The NYU Medical Center is developing a multistate data base which should resolve many of these problems in the follow-up study.

To assess the financial impact of differences in the severity of patient illnesses, the NYU Medical Center patient data were analyzed using average hospital charges and average length of stay as measures of resource consumption. The results (Table 2) showed that for every category of routine, ancillary, and total charges tracked, resource use increased dramatically with increasing severity of illness. The same was also true for average length of stay.

Similar results were obtained by examining severity levels within 15 DRG classifications. A pattern emerged in which charges rose with increasing severity levels for every DRG studied. (Figure 1 illustrates this finding for the first eight DRGs studied, given in numerical sequence). This variance in charges clearly indicates the potential financial impact of different severity distributions, because the variance could have major implications under a DRG-based system in which reimbursement is the same for all patients within a DRG regardless of the severity of the case. A hospital having a higher proportion of severely ill patients would be underpaid, while another hospital might be overpaid because its patients were less severely ill.

Severity of illness measures are a valuable tool for the internal management of hospital resources. Combined with DRGs, severity measures can yield a refined definition of the hospital's services and costs, and more exact definitions can significantly increase effective decision-making, resource allocation, and monitoring.

As noted previously, DRGs alone have high coefficients of variation in resource consumption. By combining severity of illness measures with DRGs, this variance can be significantly reduced and more homogeneous patient groups can be created. At the NYU Medical Center, the authors found that DRGs alone reduced variance of charges to patients to 40.5 percent. Adding disease staging categories to DRGs increased the reduction in variance to 54.3 percent, and combining the severity of illness index with DRGs increased the reduction in variance to 72.5 percent.

Although DRGs might be useful for allocating resources within an entire institution, at the level of the individual

TABLE 2

Average Hospital Charges (in Dollars) for 9,233 Patients with Illnesses at Four Levels of Severity, as Measured by Severity of Illness Index, New York University Medical Center, April-September 1984*

Source of Charge	Levels of Severity			
	1	2	3	4
Service Charge	1,979	6,803	17,004	32,762
Operating Room Charge	891	1,256	2,246	2,681
Pharmacy (Drugs)	150	684	2,003	4,748
Radiology	299	1,074	2,574	5,620
Laboratory	633	2,460	6,291	10,627
Medical/Surgical Supplies	281	1,201	3,103	5,063
Physical and Occupational Therapy	91	587	2,240	8,101
Blood/Anesthesia/Other	99	381	1,052	1,657
Total Charges	4,423	14,446	36,513	71,259

* Deaths were omitted. Average lengths of stay were calculated: level 1, 6.04 days; level 2, 19.76 days; level 3, 47.32 days; level 4, 77.00 days.

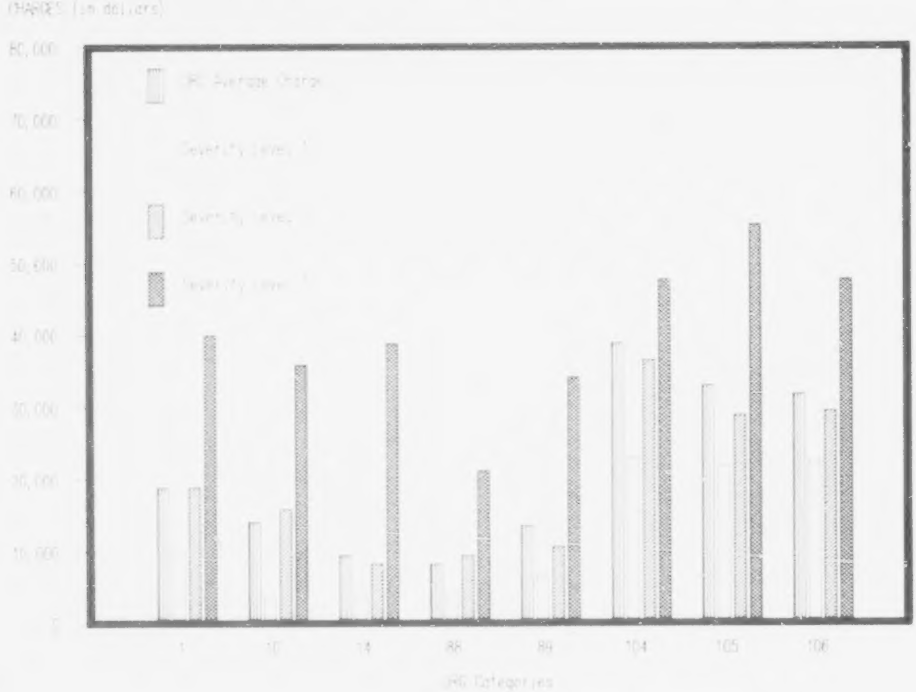

FIGURE 1

Comparison of average charges for all patients in a DRG with average charges for patients by severity level in same DRG using 584 patients in eight DRGs at three levels of severity of illness, as measured by severity of illness index, New York University Medical Center, April-September 1984 (DRG 1 pertains to craniotomy, 10 to nervous system neoplasms, 14 to cerebrovascular disorders, 88 to chronic obstructive pulmonary disease, 89 to pneumonia, 104 and 105 to cardiac surgery valve procedures, and 106 to coronary bypass surgery).

physician, severity of illness measures appear to be a better tool for predicting resource consumption of hospital facilities and services. The measures permit comparisons between a physician's practice pattern and a norm and introduce a method to determine whether a physician's claim that his patients are sicker than those of other physicians is true. For example, Figure 2 illustrates how a comparison of physicians' average costs of treating patients will differ if severity of illness is taken into account. To demonstrate this point, the authors studied the records of all patients in diagnosis related group 108 pertaining to cardiothoracic surgery procedures with heart pump at the NYU Medical Center during April-September 1984 and categorized the patients into the four levels of the severity of illness index. For comparison purposes, the record of one physician in treating patients in DRG 108 was selected to illustrate the impact of severity of illness on resource consumption. The DRG 108 patients of the one physician stayed an average of 3.4 days longer and consumed \$3,204 more in ancillary services and \$2,518 more in routine services than did the DRG 108 patients of all the physi-

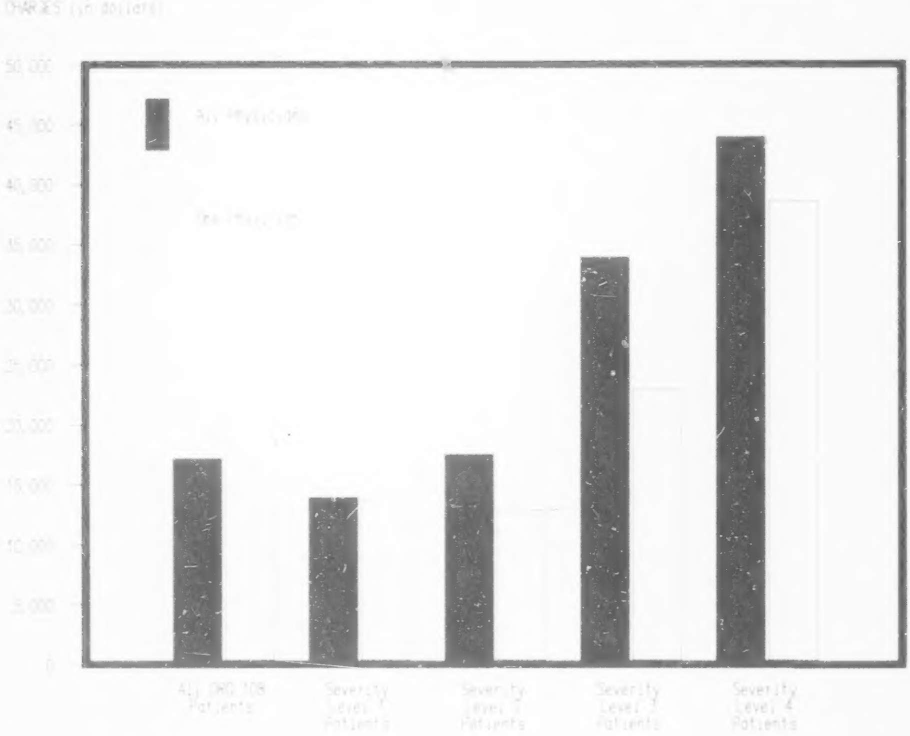

FIGURE 2

Average hospital charges of one physician and of all physicians in the treatment of patients in diagnosis related group number 108 pertaining to cardiothoracic surgery procedures with heart pump, compared by total average costs and by level of severity of illness, New York University Medical Center, April-September 1984 (the individual physician was selected to illustrate the impact of severity of illness case mix, as measured by severity of illness index, on resource consumption).

cians in the hospital. However, a comparison based on the severity of illness index levels showed that the one physician actually used proportionately fewer resources for his patients than all the physicians used for their patients. The single physician had appeared to be using more resources in the aggregate because he had a higher proportion of more severely ill patients than all the physicians.

Conclusion

The preliminary study reported here indicated that at least one measure, the severity of illness index, showed highly significant differences between the severity of cases in teaching and nonteaching hospitals. Another measure, disease staging, also showed a difference, but further study is indicated because of the need to further separate patients by disease. Severity differences within a DRG can help account for wide variations in resource consumption. Such variations make severity measures important management tools for financial planning and resource consumption reviews with physicians.

The fixed-price per case reimbursement system and the pressure on providers to reduce prices clearly threaten continuation of the practice of the teaching hospital to help finance resource-intensive tertiary services by overcharging for the less costly routine care services. This raises questions not only about the continued ability of the teaching hospital to fulfill its education and research missions but also about its capacity to be a financially viable competitor in attracting patients. In order to compete successfully for patients in providing those services also offered by nonteaching institutions, teaching hospitals must identify, quantify, and assure a source of financing for necessary activities unique to the teaching hospital. The refinement of severity of illness measures as part of management and reimbursement systems can be a large step in that direction. If severity of illness measures help describe the special burden of treatment that teaching hospitals bear, they should be used to establish the case for adequate financial support.

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Factors Used by Program Directors To Select Residents

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Abstract—A national, stratified random sample of 405 graduate medical education program directors was surveyed on the way they selected their residents. The results from the 237 respondents reaffirm earlier studies which found that the interview was the most important selection variable. The results indicate that the recent increase in competition for residency positions has increased the importance of academic variables. For example, 86 percent of the respondents stated that they would not rank a candidate who had not passed the National Board of Medical Examiners Part I examination. Because 86 percent also stated that they give preference in ranking students to those who have done well in an elective at their hospitals, the senior year of medical school may be used as a "residency chase" rather than for the general professional education of the physician.

Within the last five years, there has been a decrease in the ratio of first-year residency positions to applicants. In 1980 the ratio was 1.33 positions per applicant, and by 1985 the ratio had dropped to 1.14 positions per applicant (1, 2). Consequently, many programs have become more competitive, and students are encountering more difficulty in obtaining positions in the programs of their choice. Residency directors, therefore, feel an increasing need for useful and valid information from medical schools, and medical students and their career advisers need to be better informed about the selection criteria for residency positions.

In 1978 Wagoner and Gray (3) surveyed a national random sample of 25 percent of the program directors in internal medicine, family medicine, surgery, and pediatrics. The program directors were asked to judge the importance of 31 variables in the selection of residents. A rank order of the variables placed interpersonal skills, as demonstrated in the interview, as the single most important selection criterion.

In an effort to determine whether significant changes in residency selection variables have occurred over the past seven years and to provide advisers and students with some assessment of the current trends in selection, the authors of the study reported here undertook a new survey.

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Literature Survey

Many medical specialties have begun to assess the selection criteria and the degree to which the criteria predict the most successful resident for that specialty (4-6). In 1980 Leonard and Harris (4) examined the importance of various types of evidence and criteria used in the selection process and attempted to clarify the criteria and to generate new criteria. A survey of 24 full-time faculty members in a primary care internal medicine program at a University of Minnesota, Minneapolis, teaching hospital revealed that they gave highest ratings to the following: "good" grades in clinical work, "good" dean's letter, personal interview, "good" letters of recommendation, high internal medicine subscores on the National Board of Medical Examiners (NBME) Part II examination, high total scores on the NBME Part II examination, and knowing the person who recommended the student. When queried in open-ended questions about criteria that went beyond the rated items, the faculty members responded that the greatest weight was given to personal and interpersonal characteristics, which were felt to be more important than prior academic performance. When asked to list critical attributes in successful residents, they most commonly cited qualities needed to get the job done and qualities related to the learning process.

In 1983 Featherstone and Ramsey (5) analyzed selection criteria in order to determine the differences between primary care committees and other committees in their choices of important selection criteria for residents. Based on a limited sample of 17 faculty members from one institution, they concluded that the nonprimary care selection committees gave the greatest weight to the student's success in the internal medicine clerkship and to the strength of the recommendation letter from the department chairman. The primary care committees placed more emphasis upon the applicant's personal goals, skills, interests, and, especially, stated career goals. Another factor that appeared important to the nonprimary care selection committee was the perceived quality of the institution from which the student had received training.

A slightly different approach to viewing selection criteria was used by Clarke and Wigton (6) in their objective rating system developed for use in the selection of surgical residents. Five attributes were chosen as important in selection: knowledge, judgment, technical skills, work habits, and interpersonal skills. Twelve faculty members participated in their study, and 25 candidates were screened and evaluated. In the opinion of the faculty members, knowledge represented a third of the assessment weight, and knowledge plus judgment constituted about one half. As sources of information, approximately equal weight was allotted to dean's letters (to assess knowledge), the standard letters of recommendation or evaluation forms (to assess judgment and work habits), and the interview (to assess interpersonal skills).

Method

In March 1984 the authors of the present study surveyed residency program directors in Ohio preliminary to a planned national survey in order to determine what trends and issues should be addressed. Surveys were mailed to 216 program directors in 16 specialty areas, and 125 surveys (58 percent) were returned. The program directors were asked to select those areas they considered the most important in choosing residents for their specialty. Based on the results of the Ohio survey, the survey instrument was revised.

The revised questionnaire asked respondents to rate (on the basis of their experience in selecting residents scheduled to start in 1984) the importance of 48 resident selection variables which were mentioned in the previously cited literature or indicated as important in the Ohio preliminary survey. The importance was rated on the following scale: 1 = unimportant, 2 = some importance, 3 = important, 4 = very important, and 5 = critical. The respondents were also asked six yes-or-no questions regarding the weight they placed on specific academic credentials. Additionally, the survey asked the respondent's program type (university, community, or Veterans Administration) and open-ended questions regarding the number of positions offered, the number of completed applications, and the number of applicants interviewed.

Using the *1984–1985 Directory of Residency Training Programs* (7), the authors selected a stratified random sample of programs in internal medicine, pediatrics, surgery, obstetrics-gynecology, psychiatry, emergency medicine, family medicine, otolaryngology, and orthopedic surgery. The surveys were mailed to 405 program directors in September 1984, and 237 (59 percent) responded. Of the respondents, 45 percent were program directors, 23 percent were department chairmen, 15 percent were directors of resident education, and 17 percent directed other programs. Forty-six percent were at university-based hospitals, 52 percent at community-based hospitals, and 2 percent at Veterans Administration hospitals. The mean program size was 7.3 positions for postgraduate year (PGY) 1, 6.0 positions for PGY 2, and 2.4 positions for transitional programs (one or two years of training preliminary to entering a chosen specialty). The mean number of completed applications for all programs was 215.1, and the median was 150. The mean number of applicants interviewed per program was 85.5, and the median was 60.0.

Results and Discussion

A limitation of the study was the sample size of the smaller specialties. Although each specialty was proportionally represented in the total response group, when the group was broken down by specialty, some of the resulting sample sizes may be too small to permit meaningful conclusions. Also, as typical of written surveys, not all respondents answered all questions. The study also did not question respondents about the applicants' demographic variables (age, sex, and race), which have been known to influence the selection process, because the investigators believed that the respondents would tend to give socially desirable responses.

There was more emphasis in this study on the applicant's academic record than was reported in 1979 by Wagoner and Gray (3). Therefore, the authors of the present study believed it desirable to compare the relative importance given to academic criteria by those specialties viewed as most competitive. A number of factors can be utilized to assess competitiveness of a specialty, but the one chosen for purposes of this study was the specialty's ability to fill its positions with U.S. graduates from accredited U.S. medical schools. An ability to fill positions with these candidates is considered a measure of success, since it is assumed that U.S. graduates are better trained to enter U.S. residencies than are non-U.S. graduates. The percentage of U.S. graduates holding positions in a specialty is described in

TABLE 1

Mean Ratings of the Importance of 10 Academic Criteria in Selecting Residents as Reported in 1984 by a National Sample of Residency Program Directors in Specialties That Had More Than 80 Percent of Their Positions Filled with Graduates of U.S. Medical Schools in the 1985 Cycle of the National Residency Matching Program*

Academic Criteria	Overall ($n = 89$)		Emergency Medicine ($n = 8$)		Obstetrics-Gynecology ($n = 31$)		Orthopedics ($n = 15$)		Otolaryngology ($n = 9$)		Surgery ($n = 26$)	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Grades in clerkships of program director's specialty	3.91	0.80	3.63	0.52	3.87	0.67	3.93	1.22	4.00	0.71	4.00	0.75
Grades in electives of program director's specialty	3.81	0.91	3.88	0.64	3.68	0.87	4.13	1.19	4.00	0.87	3.69	0.84
Rank order in class	3.75	0.78	3.25	1.04	3.55	0.77	3.87	0.74	3.89	0.78	3.96	0.72
NBME Part II scores	3.64	0.85	3.38	0.74	3.48	0.85	3.60	1.06	3.78	0.83	3.91	0.73
Grades in other clerkships	3.55	0.76	3.25	0.46	3.52	0.77	3.47	0.99	3.89	0.78	3.62	0.64
NBME Part I scores	3.44	0.89	3.38	0.74	3.32	0.91	3.53	1.06	3.78	0.83	3.42	0.81
Membership in Alpha Omega Alpha†	3.43	1.20	2.88	1.36	2.93	1.16	3.73	1.16	3.56	1.13	3.92	1.23
Grades in other electives	3.13	0.82	3.00	0.93	3.06	0.77	3.20	1.01	3.56	0.73	3.08	0.74
Grades in preclinical courses	3.10	0.80	2.75	0.89	3.10	0.76	3.27	1.16	3.44	0.53	3.00	0.63
Research activities	2.85	0.88	3.13	0.99	2.52	0.96	2.87	0.92	3.44	0.73	2.96	0.77

* Rating scale: 1 = unimportant, 2 = some importance, 3 = important, 4 = very important, 5 = critical.

† Statistically significant difference in ratings among specialties, $p < .05$.

National Residency Matching Program (NRMP) data as the U.S. fill-rate (2).

Table 1 presents the ratings of academic criteria given by respondents representing specialties that filled at least 80 percent of their positions with graduates of U.S. medical schools in 1985. Of the five specialties compared in Table 1, only surgery and obstetrics-gynecology are usually taught in the third year of the medical school curriculum. Therefore, it is understandable that emergency medicine, orthopedics, and otolaryngology would rank grades in their specialty electives as high as or higher than the grades (if any) in the specialty's third-year clerkship. If a student selects a career specialty that is not in the curriculum before the fourth year, residency application deadlines place considerable pressure on that student to manage the initial quarter of the fourth year well. The problem is further exacerbated by those specialties (otolaryngology, for example) that do not participate in the NRMP and have earlier application deadlines. In these cases, students must complete relevant electives, submit residency application materials, and obtain a residency position within the first five months of the senior year.

Table 2 presents ratings of academic criteria given by respondents representing specialties that filled fewer than 80 percent of their positions with graduates of U.S. medical schools in 1985. A comparison of tables 1 and 2 shows that those specialties with more than 80 percent of their positions filled by U.S. graduates rated scores on the NBME parts I and II examinations, class rank, and membership in the Alpha Omega Alpha (AOA) honor medical society notably higher than did specialties with lower fill-rates (using Student's t-test, $p < .04$).

Although rank order in class was considered important, very important, or

TABLE 2

Mean Ratings of the Importance of 10 Academic Criteria in Selecting Residents as Reported in 1984 by a National Sample of Residency Program Directors in Specialties That Had Less Than 80 Percent of Their Positions Filled with Graduates of U.S. Medical Schools in the 1985 Cycle of the National Residency Matching Program*

Academic Criteria	Overall (*n* = 133)		Family Practice (*n* = 39)		Internal Medicine (*n* = 57)		Pediatrics (*n* = 22)		Psychiatry (*n* = 15)	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Grades in clerkships of program director's specialty‡	4.01	0.77	3.72	0.76	4.39	0.73	3.91	0.81	3.43	0.94
Grades in electives of program director's specialty	3.56	0.81	3.49	0.94	3.58	0.78	3.64	0.73	3.57	0.65
Grades in other clerkships	3.49	0.67	3.36	0.63	3.65	0.69	3.50	0.60	3.21	0.80
Rank order in class‡	3.37	0.90	2.87	0.86	3.81	1.01	3.55	0.74	2.71	0.73
Grades in other electives	3.08	0.69	3.00	0.73	3.18	0.66	3.10	0.62	2.93	0.83
Membership in Alpha Omega Alpha‡	3.07	1.07	2.46	0.97	3.70	0.98	3.10	1.26	2.14	1.35
NBME Part II scores†	2.97	0.88	2.87	0.93	3.16	0.95	3.05	0.67	2.36	0.63
Grades in preclinical courses	2.95	0.72	3.08	0.66	2.93	0.75	2.91	0.68	2.71	0.83
NBME Part I scores‡	2.87	0.91	2.74	0.99	3.12	0.91	2.86	0.79	2.21	0.80
Research activities	2.61	0.82	2.45	0.65	2.65	0.90	2.55	0.91	2.93	0.80

* Rating scale: 1 = unimportant, 2 = some importance, 3 = important, 4 = very important, 5 = critical.

† Statistically significant difference in ratings among specialties, $p < .05$.

‡ Statistically significant difference in ratings among specialties, $p < .01$.

critical by 86 percent of the respondents, the program directors reported they experienced great variation in the information schools provided concerning their students' positions in medical school classes. Miller and Leiden found that 58 percent of the medical schools responding to their 1984 national survey of deans of student affairs did not provide the student's class rank as part of their dean's letter information.* In light of the increased reliance of program directors on academic criteria, the relatively high importance assigned to NBME Part II examination scores, especially in the most competitive specialties (Table 1), is not surprising. Perhaps students who are considering the more competitive specialties should be advised of the weight given to these scores by program directors so that they consider taking the examination in time to have their scores available for program directors during the selection process.

From the series of yes-or-no questions, the authors wished to learn whether particular academic credentials influenced the program directors in selecting candidates for ranking in the residency match process. In the choices of the 237 respondents, there were no statistically significant differences between university and community hospital groups unless otherwise indicated. Responses to these questions, rank-ordered according to agreement or disagreement, were as follows:

1. Eighty-six percent gave preference in ranking to students who had done well in an elective in the program director's specialty and hospital.

2. Eighty-six percent would not rank

---

* Personal communication, Grant D. Miller, M.D., assistant dean for student affairs, and Lisa L. Leiden, Ph.D., evaluation coordinator, University of Nevada School of Medicine, Reno, Nevada, May 15, 1985.

an applicant who had failed the NBME Part I examination and had not successfully retaken it by the time of the interview.

3. Seventy-five percent would rank a candidate with an NBME Part I examination score in the 380–450 range. This response was made by 66 percent of the university hospitals and 82 percent of the community hospitals (Yates' corrected chi-square $[df = 1] = 6.3$, $p = .01$). The university hospital specialties in which fewer than 66 percent of the respondents would rank a candidate with these scores were orthopedics (33 percent), otolaryngology (50 percent), surgery (50 percent), internal medicine (57 percent), and obstetrics-gynecology (64 percent). In the community hospital programs, only orthopedics (33 percent) and surgery (40 percent) respondents had fewer than 66 percent who would rate students with these scores.

4. Fifty-five percent thought that honors grades in preclinical courses were more important than NBME Part I examination scores.

5. Forty-six percent would favor an applicant who had taken and passed the Part II examination of the NBME by the time candidates are ranked.

6. Forty-six percent selected applicants for the interview primarily on academic records. This breaks down to 54 percent for university hospitals and 39 percent for community hospitals (Yates' corrected chi-square $[df = 1] = 4.9$, $p = .03$).

Taking an elective in the program director's hospital and specialty seems to be of great importance; however, this should be interpreted cautiously, because the yes or no response did not permit the respondents to indicate uncertainty or indifference. Medical schools are concerned about the impact of the "residency chase" on the students' senior-year education. Many senior students are reported (8) to spend a considerable portion of their senior year taking electives in the specialty and the hospital in which they hope to influence the program director, faculty members, and residents with a high-quality performance. In the experience of the authors, more and more students are indicating that often the only reason they were given an interview at a hospital was because of the elective taken there. No national data have been gathered to indicate whether or not students are being denied interviews because they have not done an elective at the program director's hospital.

Because writing letters of recommendation is so time consuming, the authors of this study questioned program directors about their use of these letters. Table 3 lists the program directors' ratings of the importance of various letters of recommendation in their selection process. The table indicates that program directors tended to place greater importance on the chairman's letter than on the dean's letter (Student's *t*-test, $p = .001$ for combined group). The authors speculated that one reason is that the chairman may better understand the qualifications necessary for success in that specialty than would the dean. Another reason is that the chairman is perceived as feeling less compelled to act as an advocate for the student and can, therefore, present a more factual portrayal of the student's performance in courses of that specialty. Further because department chairmen are often in personal contact with each other by telephone and at professional meetings, the authors believe that it is important to the program directors to maintain their credibility with each other by giving accurate evaluations. This finding suggests that deans of student affairs should make different recommendations to their students on whom to seek letters from.

Some medical students are now doing

TABLE 3

Mean Ratings of the Importance of Five Letters of Recommendation in Selecting Residents as Reported by a National Sample of Residency Program Directors, 1984*

Source of Letter	Overall (n = 190)		Family Practice (n = 39)		Internal Medicine (n = 57)		Obstetrics-Gynecology (n = 31)		Pediatrics (n = 22)		Psychiatry (n = 15)		Surgery (n = 26)	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Clinical faculty member in respondent's hospital in respondent's specialty	3.91	0.85	3.88	0.99	3.86	0.80	4.07	0.92	3.91	0.61	3.79	0.58	4.00	0.98
Chairman of department in respondent's specialty†	3.90	0.79	3.61	0.98	4.04	0.77	3.94	0.73	3.90	0.70	3.58	0.67	4.15	0.73
Dean	3.71	1.00	3.67	1.08	3.93	1.00	3.42	0.92	3.73	0.94	3.60	1.12	3.69	0.93
Clinical faculty member in respondent's specialty	3.64	0.83	3.50	0.91	3.79	0.70	3.38	0.99	3.67	0.66	3.47	0.74	3.65	0.94
Clinical faculty member in another specialty†	2.91	0.68	3.06	0.68	2.95	0.59	2.77	0.80	3.14	0.79	3.07	0.59	2.54	0.65

* Rating scale: 1 = unimportant, 2 = some importance, 3 = important, 4 = very important, 5 = critical.

† Statistically significant difference in ratings among specialties, $p < .05$.

"mini-residencies" in their specialty choice in order to obtain the desired letters. Such early specialization jeopardizes the opportunity to obtain a broad clinical education. The Project Panel on the General Professional Education of the Physician has recommended that students "concentrate their elective programs on the advancement of their general professional education rather than on the pursuit of a residency position" (9).

Because the dean's letter is the letter of recommendation most likely of all letters from a medical school to be influenced by medical school policies, the survey asked the program directors to rate the importance of various types of information which could be included in the dean's letter. Although Table 3 indicates that the dean's letter is still important, Table 4 indicates that the importance would be increased by the addition of more refined and objective academic information that would help identify the problem student. One of the major criticisms of dean's letters is that they tend to be bland or give only the positive characteristics of the applicant (10). This raises the issue of whether deans of student affairs should be student advocates or factual reporters, for if a letter contains too many unfavorable facts about a student, the student may not be admitted to a residency.

As Table 4 shows, the presence of a signed waiver that the student had not viewed the dean's letter appeared to be relatively unimportant to program directors. Many deans of student affairs believed it was important for students to know what was written about them so that they could be as realistic as possible in selecting programs.

The 1978 study by Wagoner and Gray (3) showed that the interview was considered the most important selection criterion. In the study reported here, the authors asked more detailed questions about the interview in an attempt to define the applicant characteristics considered important by program directors during the interview. A comparison of Table 5 with tables 1 through 4 indicates that the interview-related items tended to be rated as more important than academic criteria or letters of recommendation. This finding is consistent with the previous studies. It must be noted, however, that academic criteria and letters of recommendation were very important in determining who would be interviewed. The data suggest that an applicant who is interviewed and does well may have a better chance to be selected than an academically stronger competitor who does less well in the interview. This conclusion is consistent with the findings of Leonard and Harris (4). The applicant's compatibility with the program was rated as the most important variable determined by the interview. Although not surprising, this leads to the question of how compatibility is assessed. (No effort was made to define compatibility in the questionnaire designed by the authors.) The authors of the present study strongly advocate that residency directors define compatibility in terms of their own selection process.

The importance of the candidate's maturity and commitment to hard work (especially for surgery) was also stressed by program directors. Again, a determination of how maturity is evaluated in the interview process is important. Medical school admissions committees have been grappling with this criterion for medical school applicants for many years, and program directors should examine their standards and procedures.

Conclusions and Recommendations

The dramatic increase in competition for residency positions has increased the fo-

TABLE 4

Mean Ratings of the Importance of Information in Dean's Letter as Reported by a National Sample of Residency Program Directors, 1984*

Information	Overall (N = 190)		Family Practice (n = 59)		Internal Medicine (n = 37)		Obstetrics-Gynecology (n = 31)		Pediatrics (n = 22)		Psychiatry (n = 15)		Surgery (n = 26)	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Hints of underlying problems†	3.96	0.88	4.00	0.96	4.21	0.77	3.87	0.88	3.82	0.66	3.00	1.00	4.16	1.03
Comments on consistency of performance	3.86	0.71	3.76	0.75	4.02	0.69	3.77	0.67	3.68	0.72	4.07	0.80	3.81	0.69
Negative comments	3.84	0.81	3.87	0.81	4.07	0.80	3.71	0.90	3.57	0.75	3.47	0.83	3.85	0.92
Highly laudatory comments from members of respondent's specialty	3.70	0.88	3.71	0.93	3.58	0.91	3.71	0.94	3.73	0.70	3.93	0.80	3.88	0.86
Overall rating based on all students in the class†	3.65	0.98	3.43	1.01	3.91	0.90	3.61	0.95	3.52	0.93	3.07	1.03	3.92	1.15
Narrative description of performance in each rotation	3.39	0.84	3.45	0.89	3.40	0.88	3.39	0.80	3.41	0.67	3.67	0.82	3.12	0.88
Personal comments on applicant	3.38	0.92	3.45	0.92	3.51	0.87	3.19	0.98	3.19	0.81	3.87	0.83	3.08	1.08
Comments on completion of curriculum in prescribed time	3.35	0.97	3.42	1.00	3.53	0.84	3.39	1.05	2.82	0.96	3.07	0.70	3.56	1.19
Delineated rank order of the candidate‡	3.28	0.94	2.79	0.84	3.49	0.95	3.26	1.03	3.50	0.67	2.60	1.06	3.79	1.10
Signed waiver indicating student has not viewed the letter	2.26	1.28	2.50	1.11	2.45	1.43	2.26	1.26	1.86	1.04	1.73	1.22	2.16	1.40

* Rating scale: 1 = unimportant, 2 = some importance, 3 = important, 4 = very important, 5 = critical.

† Statistically significant difference in ratings among specialties, $p < .05$.

‡ Statistically significant difference in ratings among specialties, $p < .01$.

TABLE 5

Mean Ratings of the Importance of 15 Applicant Characteristics Evaluated in Interviews of Residency Applicants as Reported by a National Sample of Residency Program Directors, 1984*

Applicant Characteristic	Overall (n = 190)		Family Practice (n = 39)		Internal Medicine (n = 57)		Obstetrics/ Gynecology (n = 31)		Pediatrics (n = 22)		Psychiatry (n = 15)		Surgery (n = 26)	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Compatibility with program†	4.47	0.61	4.69	0.47	4.30	0.68	4.55	0.51	4.50	0.74	4.60	0.63	4.35	0.63
Ability to grow in knowledge	4.34	0.65	4.44	0.68	4.29	0.53	4.30	0.79	4.36	0.58	4.20	0.77	4.42	0.58
Maturity	4.31	0.58	4.51	0.56	4.52	0.57	4.35	0.61	4.23	0.53	4.07	0.59	4.12	0.65
Commitment to hard work‡	4.29	0.65	4.13	0.73	4.31	0.60	4.43	0.73	4.10	0.61	4.00	0.76	4.71	0.46
Fund of knowledge	4.12	0.67	4.05	0.83	4.13	0.51	4.17	0.75	4.10	0.68	3.93	0.59	4.28	0.61
Ability to solve problems†	4.08	0.67	4.00	0.79	4.25	0.52	3.73	0.74	4.18	0.66	3.93	0.80	4.20	0.58
Willingness to seek help†	4.07	0.72	4.38	0.59	4.09	0.71	3.87	0.81	4.00	0.62	3.93	0.70	3.92	0.84
Ability to articulate thoughts	4.03	0.67	4.00	0.83	4.05	0.55	3.87	0.72	4.00	0.69	4.20	0.68	4.12	0.59
Sensitivity to other's psychosocial needs†	3.84	0.78	4.15	0.84	3.88	0.83	3.48	0.85	3.81	0.60	4.40	0.63	3.42	0.70
Realistic self-appraisal	3.79	0.85	4.08	0.96	3.77	0.60	3.61	0.99	3.73	0.78	3.67	0.82	3.77	1.03
Personal appearance and professional style	3.77	0.80	3.85	0.93	3.63	0.70	3.97	0.91	3.59	0.73	3.67	0.82	3.92	0.69
Ability to listen‡	3.74	0.69	4.13	0.66	3.67	0.64	3.52	0.89	3.50	0.60	4.13	0.52	3.58	0.70
Relevant questions asked	3.65	0.79	3.88	0.86	3.63	0.79	3.58	0.72	3.27	0.88	3.93	0.59	3.58	0.76
Level of confidence	3.55	0.72	3.62	0.81	3.54	0.63	3.42	0.76	3.52	0.68	3.33	0.72	3.77	0.71

* Rating scale: 1 = unimportant, 2 = some importance, 3 = important, 4 = very important, 5 = critical.

† Statistically significant difference in ratings among specialties, $p < .05$.

‡ Statistically significant difference in ratings among specialties, $p < .01$.

cus on academic criteria during the seven years since the Wagoner and Gray study of 1978 (3), although the interview remains as the most important selection criterion. Consequently, the importance assigned to various selection criteria does not differ among specialties as much as one might have anticipated. Students are now more likely to have to consider more than one specialty option. It would be helpful for all concerned—students, deans of student affairs, student advisers, and program directors—if the qualifications sought by individual programs were published and distributed.

The interview process is both time consuming and expensive to students and program directors. Students need to be aware of the criteria that are most important during the interview, and they need to make a critical self-analysis of their career goals.

Because the competition for residency positions has increased greatly for many of the specialties, students are applying to more programs than they did in the past, significantly increasing the work load for program directors. Students report that many interviews are granted on a first-come-first-served basis, which causes them to apply earlier than they might otherwise. Pressure from programs outside the NRMP that notify students of their selection decisions five months into the senior year has further heightened anxiety, and this anxiety appears to be spreading to the entire process.

In order to do more than a superficial evaluation of a career area, students need earlier elective experiences or they will be forced to make premature decisions on limited information. Many medical schools have made substantial curriculum changes in their third-year programs in order to meet the demands being placed upon them by residency program directors, changes that tend to move in a direction opposite to the stated national goals of achieving the general professional education of the physician (9).

The whole area of graduate medical education is in transition, and further reduction of residency positions seems imminent. Until medical school enrollments are also reduced, students will likely face increased competition to obtain the specialty training of their choice. Students are already beginning to assess and seek the specialty they can get into rather than the medical field for which they may be best suited. This could create a greater number of dissatisfied physicians. Now may be the time to review the resident selection process and to improve the National Residency Matching Program so that all specialties will take part in it, thereby providing all students and program directors equal access to each other.

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DATAGRAM

Reapplicants to U.S. Medical Schools, 1981 Through 1984

Although most applicants to medical school in a given year are applying for the first time, a substantial number are reapplying after an unsuccessful attempt in a previous year. Since these reapplicants are in general less successful than first-time applicants in gaining admission, the overall statistics covering both kinds of applicants that are published in the annual editions of *Medical School Admission Requirements* (1) and the annual education issues of the *Journal of the American Medical Association* (2) may portray a bleaker picture of the difficulty of achieving entry to medical school than is warranted.

Until recently, good statistical information on reapplicants was difficult to derive because it required combining information collected in several application years. However, with completion of the Student and Applicant Information Management System of the Association of American Medical Colleges, collated data on all applicants to U.S. medical schools since 1973 are now available. The report presented here includes information on applicants for the entering classes of 1981 through 1984 but takes into account previous applications since 1978. Less complete information on reapplicants for earlier years was included in previous AAMC publications (3, 4).

Method

For each application year, a previously unsuccessful applicant was defined as an individual who had also applied in one or more of the preceding three years. Although this approach may have resulted in identifying as a first-time applicant the rare individual who may have applied again after a hiatus of more than three years, it allowed consistent treatment of each of the four application years in the study. Thus, for example, for 1981 a previously unsuccessful applicant was one who had applied at least once in the years 1978 through 1980 and again in 1981; and for 1984 a previously unsuccessful applicant was one who had applied at least once in 1981 through 1983 and again in 1984.

The previously unsuccessful applicants were further subdivided into those who applied in only one prior year and those with several prior applications. The group of those who had applied in one prior year was further subdivided into those applying in the previous year only and those applying in an earlier single year.

Previously matriculated applicants were the small number of applicants each year who had attended medical school during the previous three years but had dropped out or had been dismissed. Previously accepted applicants were those who had received an acceptance in one of the previous three years but had not matriculated. Many of these previously accepted students had been granted delays in matriculation by the school that originally accepted them.

The remainder of the students, that is, those who had no record of an application within three years, were considered first-time applicants. All of the categories are mutually exclusive; thus, the sum of the numbers of applicants, accepted students, or matriculants in all the categories is equal to the number of all applicants, all accepted students, or all matriculants, respectively. The percentage accepted in each category is the number who were accepted divided by the number of applicants, and the percentage matriculated is the number who matriculated divided by the number of applicants.

Results and Discussion

As shown in Table 1, the aggregate number of applicants, accepted students, and matriculants all declined very slightly over the four-year period ending in 1984. The number of applicants declined by 2.1 percent, the number accepted by 1.8 percent, and the number

TABLE 1

Numbers and Percentages of Applicants to U.S. Medical Schools, by Application Status, 1981 Through 1984

Applicants' Status	1981		1982		1983		1984	
	No.	Percent.	No.	Percent.	No.	Percent.	No.	Percent.
First-time applicants								
Applied	26,621	100.0	25,597	100.0	25,317	100.0	26,059	100.0
Accepted	13,761	51.7	13,588	53.1	13,444	53.1	13,520	51.9
Matriculated	13,272	49.9	13,036	50.9	12,878	50.9	12,927	49.6
Previously unsuccessful applicants								
One prior application								
In year prior								
Applied	5,516	100.0	5,660	100.0	5,178	100.0	5,341	100.0
Accepted	2,061	38.4	2,280	40.3	2,065	39.9	2,082	39.0
Matriculated	2,061	37.4	2,203	38.9	1,999	38.6	1,997	37.4
In other year								
Applied	1,643	100.0	1,485	100.0	1,678	100.0	1,594	100.0
Accepted	428	26.0	424	28.5	516	30.7	460	28.9
Matriculated	412	25.1	399	26.9	493	29.4	441	27.7
Two or three prior applications								
Applied	2,376	100.0	2,306	100.0	2,284	100.0	2,199	100.0
Accepted	713	30.0	680	29.5	765	33.5	716	32.6
Matriculated	690	29.0	659	28.6	742	32.5	686	31.2
Previously accepted applicants								
Applied	280	100.0	340	100.0	434	100.0	446	100.0
Accepted	241	86.1	281	82.6	388	89.4	388	87.0
Matriculated	213	76.1	246	72.3	351	80.9	328	73.5
Previously matriculated applicants								
Applied	291	100.0	342	100.0	309	100.0	306	100.0
Accepted	23	7.9	41	12.0	31	10.0	28	9.1
Matriculated	12	4.1	24	7.0	17	5.5	16	5.2
All applicants								
Applied	36,727	100.0	35,730	100.0	35,200	100.0	35,944	100.0
Accepted	17,286	47.1	17,294	48.4	17,209	48.9	17,194	47.8
Matriculated	16,660	45.4	16,567	46.4	16,480	46.8	16,395	45.6

matriculated by 2.6 percent. The overall probability of gaining admission ranged between 45.4 and 46.8 percent during 1981–1984.

First-time applicants were 72.5 percent of all applicants in 1984 but were 79.7 percent of matriculants. The proportion of first-time applicants accepted in 1984 was 51.9 percent, which was substantially higher than for any of the groups of previously unsuccessful applicants.

In 1984, 39 percent of the individuals who applied for the second consecutive year were accepted, while only 28.9 percent of those who applied for the second time after a hiatus were accepted.

More than 2,000 of the applicants who applied each year were doing so for at least the third time. These individuals had a considerably lower chance of success than first-time applicants, but almost one-third of them did eventually gain acceptance and matriculate. Including these and the other reapplicants in the aggregate statistics for applications gives first-time applicants an incorrect impression of their chances of acceptance, but the error is not as great as might have been feared.

The previously accepted group had an acceptance rate in 1984 of 87.0 percent, which is higher than that of any of the other groups reported. However, many of these individuals had been granted deferred matriculation by the school that originally accepted them. The authors have not analyzed the data to separate those previously accepted at the same school from those previously accepted at another school or to separate those already accepted in the previous year from those accepted in an earlier year. This group of previously accepted applicants is small but definitely growing, rising from 280 in 1981 to 446 in 1984. Over 15 percent of the individuals accepted from this group in 1984 did not matriculate; in contrast less than 5 percent of accepted first-time applicants that year failed to matriculate.

The previously matriculated applicants were unlikely to gain a second chance at medical education. Only 9.1 percent were accepted in 1984, and only 5.2 percent matriculated.

To summarize, almost three quarters of all applicants in any given year are first-time applicants. Reapplicants have a smaller but still good chance of acceptance. The data describing all applicants show a somewhat lower probability of gaining acceptance to medical school than do the data describing first-time applicants.

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Supplement

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Study of Required Clerkships in Internal Medicine In U.S. and Canadian Medical Schools

William D. Bradford, M.D., and James R. Schofield, M.D.

Abstract—The authors studied the teaching of clinical skills and the supervision of clinical education of undergraduate medical students by reviewing students' patient-related experiences in required internal medicine clerkships in the United States and Canada during the 1979–1982 accreditation cycle of the Liaison Committee on Medical Education. The reported patient-related experiences of 180 medical students from 42 medical schools who took histories and performed physical examinations on 2,891 patients formed the basis of this paper. Variability in clerkship length, time worked, supervision, and patient mix suggests that additional quantitative data should be sought on medical students' experiences during the clerkship.

The internal medicine clerkship is recognized by many educators as the keystone of the clinical experience for the undergraduate medical student. In this setting, the unique nature of medical education is realized by the presence of teacher, student, and patient. The clerkship experience permits the student to develop the vital skills of interviewing, observation, and examination that form the basis for sound clinical reasoning, judgment, and decision-making.

Over the past two decades, tremendous pressures have been placed on students in the clerkship. Two significant factors have been (*a*) the increased number of clinical clerks and allied health students who must be taught and (*b*) increasing demands placed on the clinical faculty for teaching, patient care, research, and administration. It is not surprising, therefore, that some observers (1) have suggested that medical schools may be neglecting the teaching and supervision of clinical skills. Such a hypothesis is supported in part by a study (2) detailing frequently observed errors in the physical examination by medical house officers.

Because of the great importance of medical students developing proper clinical skills, the Division of Accreditation of the Association of American Medical Colleges has made a study of required clerkship experiences in programs in undergraduate medical education. The basis for the present report is a survey questionnaire on patient-related experiences in required clerkships in internal medicine requested from students in those schools involved in the 1979-1982 accreditation cycle of the Liaison Committee on Medical Education (LCME). The

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students' responses provided quantitative information on duration of required clerkship, supervision, and patients.

Materials and Methods

A total of 180 clerkship questionnaires describing in part patient-related experiences of medical students in required clerkships in internal medicine at 42 schools of medicine in the United States and Canada during the 1979–1982 LCME survey cycle provided data for the study reported here. The 42 schools were selected only on the basis that their accreditation review fell within the 1979–1982 period. The questionnaires, part of the review process, were distributed by each school to varying numbers of medical students in required clinical clerkships and presented to the accreditation team at the time of the site visit. All schools responded, but not all of the questionnaires were complete. Ten questionnaires were illegible and eliminated from this study. A majority of the responding medical students had completed the clerkship when sampled.

Information tabulated included the duration of clinical clerkships, number of clinical clerks per rotation group, manner of assignment of patients, duty hours, a list of assigned patients on which the student completed a history and physical examination, and designation of clinical supervisors who checked "write-ups" and offered constructive criticism. The number of student responses per question varied because not all students answered every question, some responses were not legible and were deleted, and some students had not completed the clerkship when they responded. In order to tabulate the students' experiences with patients with different diseases, the students' logs of patients were categorized according to the major disease systems that are chapter titles in standard textbooks of internal medicine.

Results

Clerkships ranged from six to 15 weeks in duration. One clerkship was 15 weeks in length, one was 13, 20 clerkships were 12, four were 11, one was 10, two were nine, eight were eight, and five were six weeks.

A vast majority of the medical students reported working long hours, although considerable variability occurred from school to school and student to student. The 170 students who reported their hours stated that they worked a total of 1,762 hours daily (a mean of 10.4 hours per day) and a total of 11,522 hours weekly (a mean of 67.8 hours per week).

Of the 180 students who responded regarding the assignment of patients, 129 (72 percent) reported that patients were assigned to them on rotation within their clinical group. Sixty-one students (47 percent) noted that patients were assigned by residents (excluding interns), eighteen students (14 percent) were assigned by interns, and nine students (7 percent) selected patients from admission logs or received new patients only the days they were on call. Forty-one students (32 percent) indicated they received new patients by one or more methods, including rotation or assignment by faculty members, residents, or interns.

The number of patient work-ups by each student correlated with the length of the clerkship. Three major groupings of clerkships of 12, 8, and 6 weeks in length were selected for display (Table 1). The range of maximum and minimum patient-related experience varied among these clerkships. The medical student performed work-ups on approximately two patients per week in these clerkships. There was marked variability in the num-

TABLE 1

Length of Internal Medicine Clerkships as Related to Numbers of Patient Work-Ups per Student and Numbers of Disease Categories Seen by 143 Students at 42 U.S. and Canadian Medical Schools, 1979–1982

Clerkship Length in Weeks	No. of Schools	No. of Students	No. of Patient Work-Ups Per Student				No. of Disease Systems Seen		
			Maximum	Minimum	Median	Per Week	Maximum	Minimum	Mean
12	20	107	33	6	19	1.6	15	2	9.9
8	8	20	32	8	14	1.9	13	5	9.1
6	5	16	21	7	11	2	10	4	7.3

ber of students in the clinical rotation groups, ranging from one to 16. Because this questionnaire item was not more specific, the authors were unable to determine how many students competed for the available patients in each clinical setting.

To study patient-related experience by disease system, systemic categories of disease were selected from standard textbooks of internal medicine, and the experiences of the 165 students who responded to questions on their patients were sorted into these categories. The students saw a total of 2,891 patients. Because diseases seldom fit into clear-cut categories and many diseases cross several systems, it was important to make consistent judgments as to the major disease system involved in categorizing each patient. For example, patients with diabetes mellitus were placed in the metabolic category, and those with alcoholic cirrhosis were listed under hepatobiliary disease rather than nutritional disease, which might also have been appropriate.

Table 2 gives the number and percentage of patients in each disease category. A majority of the students' clinical experiences were obtained from patients with heart disease, cancer, and respiratory disorders. Very few patients were seen with primarily dermatologic, critical care or accidents, and neuromuscular disorders.

TABLE 2

Numbers and Percentages of 2,891 Patients in 21 Internal Medicine Disease Categories Seen by 165 Students at 42 U.S. and Canadian Medical Schools, 1979–1982

Disease Category	No. of Patients	Percentage of Total
Heart	422	14
Oncology	402	14
Respiratory	313	11
Alimentary	228	8
Metabolic, diabetes mellitus	212	7
Infectious disease	207	7
Central nervous system	166	6
Vascular	158	5
Genitourinary	119	4
Hepatobiliary, alcoholic cirrhosis	116	4
Drug intoxication and abuse	102	4
Hematology	82	3
Immune	70	2
Bone and joint	51	2
Endocrine	51	2
Pancreas	50	2
Behavioral/psychiatric	49	2
Neuromuscular	35	1
Critical care/accident	28	*
Dermatology	20	*
Nutritional	10	*

* Less than 1 percent.

To gauge the breadth and appropriateness of students' experiences with patients, the authors examined the experiences of students who saw a small number of patients, those who saw a large number of patients, and those who, in the authors' opinion, may have had unbalanced experiences. Table 3 displays the low, median, and high levels of experiences with

TABLE 3

Numbers of Patients, Numbers of Disease Categories, and Percentages of Patients in One Disease Category Seen By 22 Selected Students in Required Internal Medicine Clerkships, By Levels of Patient-Related Experience, in 16 Medical Schools, 1979–1982

	12-week Clerkship			8-week Clerkship			6-week Clerkship			Unbalanced Clerkships (12 Week)		
Levels of Experience*	No. of Pat. Seen	No. of Dis. Categ. Seen	Perc. of Pat. in One Dis. Categ. Seen	No. of Pat. Seen	No. of Dis. Categ. Seen	Perc. of Pat. in One Dis. Categ. Seen	No. of Pat. Seen	No. of Dis. Categ. Seen	Perc. of Pat. in One Dis. Categ. Seen	No. of Pat. Seen	No. of Dis. Categ. Seen	Perc. of Pat. in One Dis. Categ. Seen
Low												
Student 1	6	6	17	9	6	50	7	5	40	16	7	56
Student 2	6	4	33	8	7	25	6	4	67	21	8	62
Median												
Student 3	19	7	42	14	10	28	11	7	36	10	2	90
Student 4	19	10	26	14	5	36	11	8	27	10†	4	60
High												
Student 5	35	13	28	32	13	12	21	9	28			
Student 6	33	14	18	20	13	20	21	10	33			

* Levels of experience indicate those students who obtained histories and performed physical examinations on the fewest number of patients, on the most number, and on a median number of patients in each clerkship category.

† Clerkship length was 6 weeks.

patients for 22 selected students in clerkships of 12, 8, and 6 weeks' duration. For each clerkship group displayed, the authors selected two of the students who saw the fewest patients, two who saw the median number, and two who saw the most patients. The assumption is that students who see too few patients and those who see too many may not have optimum experiences. Listed for each selected student are the total number of patients seen, the total number of disease systems into which his patients could be placed, and the percentage of patients who fell into only one disease category. The experiences of these selected students emphasize the variability within clerkships of the clinical experience in terms of the number of patients and disease systems with which the student comes in contact. A vast majority of the 22 students had patient-related experiences within several disease systems. However, a few recorded experiences which might be considered unbalanced, since 56, 60, 62, 67, and 90 percent of their patients fell within one category of disease.

A total of 176 students designated those physicians who supervised their clinical experience, heard presentations, checked write-ups, and offered constructive criticism. These teaching and supervisory responsibilities were almost always shared by faculty members, residents, and interns, with the combination of faculty members and residents shouldering the major responsibility. The faculty assumed major roles in supervision (99 percent) and hearing the findings of student workups (96 percent). Faculty members were less involved in checking write-ups (59 percent) and offering constructive criticism (66 percent). Students cited residents as giving supervision (88 percent), hearing presentations of history and physical examinations (69 percent), checking write-ups (59 percent), and giving constructive criticism (57 percent). Interns were least involved in clerkship responsibilities, although 40 percent of the students cited them as sharing supervision. It should be noted that all students had the opportunity to present their patient work-ups. Only one of the 176 students reported that her write-ups were not checked, and only two students said they received no constructive criticism.

Discussion

To study the qualitative and quantitative aspects of the required clerkship in internal medicine, the authors analyzed the patient-related experience of 180 medical students at 42 U.S. and Canadian medical schools who took histories and performed physical examinations on 2,891 patients. The length of the clerkships varied from six to 15 weeks. Similar variability was found in the number of hours worked per day and per week, the number of patients seen, and the amount of supervision by faculty members and residents. Unsurprisingly, the authors found that the students reported working long hours (an average of 10.4 hours per day and 67.8 hours per week).

The students saw a variety of disease processes, and these related in a general way to the length of their clerkship experiences. The most frequent categories of disease seen by the students were heart disorders, cancer, and disease of the respiratory system. Much less experience was recorded in dermatologic, critical care and accident problems, and neuromuscular disorders. The lack of student experiences in dermatology, critical care, accident, and neuromuscular disorders during the required clerkship reflects more the specialization of medical centers as providers of tertiary care than a deficiency in general medical teaching. It should be emphasized that a vast majority of the nutritional problems in the study were related to alcoholic liver disease and were tabulated under the hepatobiliary heading. The small number of cases in skin, critical care and accident, neuromuscular, and behavioral/psychiatric headings is not necessarily a cause for alarm, since a majority of medical students have clerkship experiences in surgery and psychiatry; critical care, neurology, and dermatology are offered as fourth-year elective experiences. The students' patient-related experiences compared favorably with mortality rates in the United States in 1981, when the leading causes of death were diseases of the cardiovascular system, including heart, atherosclerosis, and hypertension; malignant neoplasms; cerebrovascular diseases, accidents, poisoning, and violence; diseases of the respiratory system; and diseases of the digestive system (3).

Students' experiences with patients were examined in terms of the number of patients seen. The question of breadth of experience may be raised for students who saw few patients. In the present survey, the authors did not evaluate the quality of a student's experience in terms of an in-depth study or thorough knowledge on the part of the student of the individual patient. For example, a student who prepared a thorough work-up and did readings on six patients could have had a superior educational experience to that obtained if he had worked on 20 to 30 patients whose disease processes were neither carefully studied nor understood. The authors are concerned about the students who seemed to have unbalanced experiences (Table 3). Undoubtedly, a great deal may be learned about a group of patients within one category of disease, but seeing 56 to 90 percent of patients in one disease category may not provide appropriate experience for a medical student in a required clerkship in internal medicine. The critical issue here is assignment and monitoring of a student's clinical experience, and it is possible that in some schools this issue needs attention. Perhaps a responsible teacher should monitor an individual student's experience to ensure that it meets the objectives of the clerkship. Asking students to maintain a log of their patient-related experiences might prove helpful.

In summary, the preliminary survey reported here has provided some quantitative measures of internal medicine clerkships in terms of hours, patients seen, and supervision, but it does not answer the basic question of whether medical schools are neglecting the teaching of clinical skills and supervision of clinical training. Because of the great variability in numbers of patients seen and the indication that some students may see too few different disease categories, further questions should be asked. How does the medical student spend his time during the clerkship? Who observes the student who takes a history and performs a physical examination? What rounds does the student attend and/or participate in, and what responsibilities does he accept? Is the student treated as an observer or an active participant? Such information in quantitative terms is necessary for the proper evaluation of medical students' basic clinical experience.

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The Effect of Commercial Coaching Courses On Performance on the MCAT

Robert F. Jones, Ph.D.

Abstract—Two studies on the relationship between taking a commercial coaching course and performance on the Medical College Admission Test (MCAT) are reported. In both studies, one based on repeating examinees and another based on first-time examinees, differences in scores favoring coached examinees were found on the Science Knowledge and Science Problems subtests. The results on the Skills Analysis: Quantitative subtest were mixed, while neither study found differences between the two groups in scores on the Skills Analysis: Reading subtest. The analyses further revealed that the differences in scores on the Science Knowledge and Science Problems subtests were less pronounced for examinees with low scores on the Skills Analysis: Reading and Skills Analysis: Quantitative subtests, examinees with very low or very high undergraduate grade-point averages, and examinees from very selective undergraduate colleges. The substantive importance of the differences was also explored. The coaching effect was estimated to increase an average student's probability of acceptance by 5 percentage points. The results suggest that coaching for the MCAT has a limited effect that supports rather than undermines the validity of the test.

A growing debate has emerged in recent years concerning the effects that commercial test-preparation services or coaching courses have on students' performance on standardized tests. The debate was joined in 1979 with the publication of two reports (1, 2) by the Federal Trade Commission (FTC), which had launched an investigation of commercial services preparing students to take the Scholastic Aptitude Test (SAT) and the Law School Admission Test (LSAT). The two reports differed in their conclusions regarding the effectiveness of coaching for these tests. Much of the research literature on coaching, before and after the FTC reports, has tended to focus on the SAT. Messick (3) provided a reanalysis of the FTC data from several perspectives, and Messick and Jungeblut (4) wrote a review of studies of coaching for the SAT. They concluded that short-term coaching for the SAT generally has only minor effects on performance, although countervailing views persist (5).

The coaching issue has more recently surfaced in research in medical education. Scott and colleagues (6) reported significantly higher scores on Part I of the National Board of Medical Examiners (NBME) examinations for a group of stu-

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For related datagram, see page 335.

dents enrolled in a commercial coaching course compared with a control group matched on basic science grade-point average. Scott's findings contrasted with the results of a similar study by Lewis and Kuske (7), who failed to find any differences in performance on an NBME examination between coached and uncoached students. Anderson (8) raised the coaching issue with regard to the Medical College Admission Test (MCAT), but no studies have yet been reported.

The data reported here present the results of two studies designed to determine differences associated with taking commercial coaching courses on the performance of first-time and repeating MCAT examinees.

Background

Resolution of the controversy over the effects of coaching on performance has generally been hampered by differences in the meaning given to the term coaching and misconceptions about the nature of aptitude and achievement that standardized tests purport to measure (9). Cole (10) lists six possible components of test-preparation programs, each of which has varying implications for test validity: supplying correct answers (cheating), taking the test for practice, maximizing motivation, optimizing test anxiety, instructing in test-taking skills, and instructing in test content. The first component is quite obviously associated with the negative connotations of coaching and poses a definite threat to test validity. Instruction in test-taking skills, the fifth component, may also have a negative connotation if the test-taking instruction is specifically directed to flaws in test construction that cue students to the correct answer. As with the first component, students coached in this manner may achieve scores that overestimate their knowledge and skills. Instruction in general test-taking skills (for example, following instructions carefully and allotting time properly), and in methods for increasing motivation and controlling anxiety and practice in test-taking do not enable students to achieve scores that overestimate their true level of knowledge and skills. Rather, such instruction reduces the chances of underperforming. However, insofar as these factors account for differences in scores, students coached in this manner may have an advantage that lowers the overall validity of the test. The last component, instruction in test content, departs radically from the popularly held connotations of coaching but is an important element of many programs. The objective of such instruction is to increase the test-taker's knowledge and skill and as such does not necessarily lower test validity.

The relative emphasis given to each of these components within a coaching course tends to differ, depending upon whether the test is measuring aptitude or achievement. Aptitude tests like the SAT and LSAT assess basic analytical skills that are developed formally and informally over a long period of time. The underlying assumption that has driven researchers to focus on differences in performances resulting from coaching for these tests is that the abilities being tested should be relatively resistant to short-term intervention. If significant and substantial effects of coaching on performance were found for this kind of test, which includes the MCAT Skills Analysis (SA): Reading and Skills Analysis: Quantitative subtests, the validity of the test may be reduced, since the difference in the examinees' performances may derive from one of the components of coaching programs other than instruction in content that Cole (10) identified.

Achievement tests on the other hand, like the NBME examinations or the MCAT Science Knowledge and Science Problems subtests, by their nature reflect the influence of instruction and of study and review of the content areas covered. Coaching for achievement tests generally includes a structured review of content areas in addition to the usual advice on test-taking strategy and practice. To the extent that students who enroll in test-preparation courses for NBME examinations or the MCAT Science Knowledge and Science Problems subtests engage in a formal review of the subject matter covered, they might plausibly expect some enhancement of performance. In fact, the absence of any effect on these tests from well organized study and review over time, whether conducted in concert with a formal course or independently, would bring into question the construct validity of these tests. The effect of commercial coaching courses on performance on the NBME examinations or the MCAT Science Knowledge and Science Problems subtests threatens the validity of these tests only to the degree to which the magnitude of the effect exceeds reasonable expectations based on the nature and duration of the review program or to the extent to which the effect changes the predictive relationship between the test-taker's performance and subsequent academic performance.

Coaching and Test Repeaters

In the first study, the effects of commercial coaching courses on performance on the MCAT were examined using five samples of test repeaters from the years 1977 through 1981.

METHOD

Data were obtained from the MCAT program files of the Association of American Medical Colleges (AAMC). In each year, those examinees were identified who took the MCAT for the first time at the spring administration and then repeated the test the following fall. Examinees who had taken a commercial coaching course prior to the spring administration or those for whom that information was not available were eliminated from each sample. The remaining examinees were divided into those who took a commercial coaching course prior to the fall administration and those who did not. Information on the examinees' coaching course experience was based on their self-report on a questionnaire given at each test administration. The final samples for each of the years 1977 through 1981 were 5,014, 4,132, 3,318, 3,087, and 3,047 test repeaters, respectively. The percentages of repeaters in each sample who had taken a commercial coaching course between test administrations were 15, 19, 21, 26, and 32, respectively.

The study design enabled the scores of each group on the fall test administration to be compared, with each group's scores from the spring test administration serving as the baseline measure. It is important to note that the study design was not a true experimental design. The examinees were neither randomly selected nor randomly assigned to groups. The myriad other factors that might differentiate the two groups in addition to their coaching course experience and that might be related to gains in scores could not be controlled. Among the most important of these possible factors was the examinees' motivation to perform well, as reflected in the number of hours spent in preparation for the test. Therefore, any differences found in the scores of the two groups could be interpreted only as being associated with taking a commercial coaching course and not necessarily as being due to the course itself. Despite this limitation, the importance of the issues surrounding commercial coaching courses more than justified pursuing the analyses.

The study design lent itself to a straightforward comparison of gains in scores as a way of determining differences associated with taking a review course, although certain statistical adjustments had to be made. Simple comparisons of gains have been shown to be misleading when the groups differed in their initial performance (11). In general, individuals with lower initial performance tend to make greater gains on retesting, all other things being equal, because of certain measurement properties of the scores. In the present study, analysis of covariance was used to adjust the mean scores of the fall group for differences in initial test performances. From these data, new adjusted gains for each group were derived by computing the difference between each group's adjusted mean performance on the fall administration and the mean performance for both groups of examinees combined on the spring administration.

Further analyses were undertaken to determine whether any performance differences found between coached and uncoached examinees varied among specific subgroups. For example, did women receive the same benefits from coaching courses as men did, or minorities the same as nonminorities? The subgroup characteristics selected for examination were sex; age (over 22 and 22 or younger); minority status (blacks, American Indians, Mexican-Americans, mainland Puerto Rican, and all others), undergraduate major (biological science, premedical science, physical science, mathematics and/or statistics, social science, humanities, and all others); level of course work in biology, chemistry, and physics; and level of performance on the SA: Reading and SA: Quantitative subtests. Statistical tests to measure any significant interaction effect in analysis of covariance were performed with one of the study samples.

RESULTS

Table 1 compares the average gains in scores, adjusted for initial score differences, of coached and uncoached examinees. These gains should be viewed in the context of the MCAT score scale, which ranges from 1 to 15 (15 is the highest score). The mean of the norm group (spring 1977 examinees) was 8.0 and the standard deviation 2.5 in each area tested. Comparisons are made in Table 1 for each area of assessment across the five samples.*

In 28 of the 30 comparisons (five samples times six subtests), a difference in gains was found that favored those taking commercial coaching courses. In 24 of these 28, the differences were statistically significant ($p < .01$). Differences were observed at three levels of magnitude. Scores on the Science Knowledge and Science Problems subtests showed differences that were similar to each other and were the largest overall. The coached examinees tended to improve their scores approximately one to one-and-a-half scale score points on the repeat administration; uncoached examinees improved their scores approximately one-half to one scale score point. The differences between the groups were approximately one-half of a scale score point. Evidence of a trend in these differences over time was mixed. Scores in the Biology, Physics, and Science Problems areas showed a generally upward trend, but the major increase on these subtests was between

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* A detailed summary of these and other data reported in this study is available from the author.

TABLE 1

Adjusted Mean Gains in Scores of 18,598 Coached and Uncoached Examinees Who Repeated the Medical College Admission Test (MCAT), 1977 through 1981*

MCAT Subtests/Examinees	Year†					Average Across Years
	1977	1978	1979	1980	1981	
Biology						
Coached examinees	1.15	1.44	1.44	1.19	1.04	1.25
Uncoached examinees	.77	.99	.88	.58	.42	.73
Difference in gains	.38	.45	.56	.61	.62	.52
Chemistry						
Coached examinees	1.23	1.11	1.24	1.07	1.01	1.13
Uncoached examinees	.72	.64	.87	.69	.52	.69
Difference in gains	.51	.47	.37	.38	.49	.44
Physics						
Coached examinees	1.16	1.47	1.12	1.13	1.20	1.22
Uncoached examinees	.89	.94	.49	.56	.49	.67
Difference in gains	.27	.53	.63	.57	.71	.55
Science Problems						
Coached examinees	1.12	1.48	1.26	1.16	1.14	1.23
Uncoached examinees	.88	1.08	.74	.66	.55	.78
Difference in gains	.24	.40	.52	.50	.59	.45
SA: Reading						
Coached examinees	.60	.90	.52	.48	.84	.67
Uncoached examinees	.66	.79	.43	.49	.75	.62
Difference in gains	−.06‡	.11‡	.09‡	−.01‡	.09‡	.05‡
SA: Quantitative						
Coached examinees	.98	.96	.91	.61	1.02	.90
Uncoached examinees	.81	.77	.58	.30	.77	.65
Difference in gains	.17‡	.19	.33	.31	.25	.25

* For explanation of adjusted scores, see text.

† Sample sizes: 1977 = 759 coached, 4,255 uncoached; 1978 = 799 coached, 3,333 uncoached; 1979 = 710 coached, 2,608 uncoached; 1980 = 817 coached, 2,270 uncoached; 1981 = 989 coached, 2,058 uncoached.

‡ $p > .01$; all other differences are statistically significant.

1977, the first year of the new MCAT, and 1978. Scores on the Chemistry subtest, showing the largest differences in 1977, was the exception to this trend.

The data for SA: Quantitative subtest scores reflected a smaller difference. Both the overall gains in scores and the differences between the coached and uncoached groups were lower than those observed on the Science Knowledge and Science Problems subtests. The advantage for those taking commercial coaching courses was reduced to one-fourth of a scale score point when averaged across samples. This difference was statistically significant in four of the five samples.

The smallest gains were observed for the SA: Reading subtest. Differences in gains between the two groups were indistinguishable, consistently failing to achieve statistical significance in all five samples studied.

The effects of coaching courses were not found to differ significantly between examinee subgroups, except those based on the level of the examinees' initial score on the SA: Reading and SA: Quantitative subtests. The examinees with lower scores on these subtests, and presumably weaker skills, tended to benefit less from the coaching course in terms of improving their performance on the science areas of assessment than examinees with average or high scores. Minority examinees in each sample of test repeaters tended to cluster among the examinees with the lower scores on the SA: Reading and SA: Quantitative subtests. This confounding made it impossible to determine whether minority examinees as such benefited less from commercial coaching courses than did nonminority examinees.

Figure 1 illustrates how the effects of coaching courses on performance were related to the test-taker's reading and quantitative skills. Three groups of examinees were defined by the average of their initial scores on the SA: Reading and SA: Quantitative subtests: low-skills score (mean = 1–6.5); medium-skills score (mean = 7.0–8.0); high-skills score (mean = 8.5–15). Within each of these groups, the differences in gains in scores on the Science Knowledge and Science Problems subtests between coached and uncoached examinees were computed. For economy of presentation, the differences were averaged across Science Knowledge and Science Problems subtest scores and were plotted in Figure 1 for each of the five samples. It should be noted that this averaging gives a double weight to Science Problems scores, as explained in the *MCAT Interpretive Manual* (12).

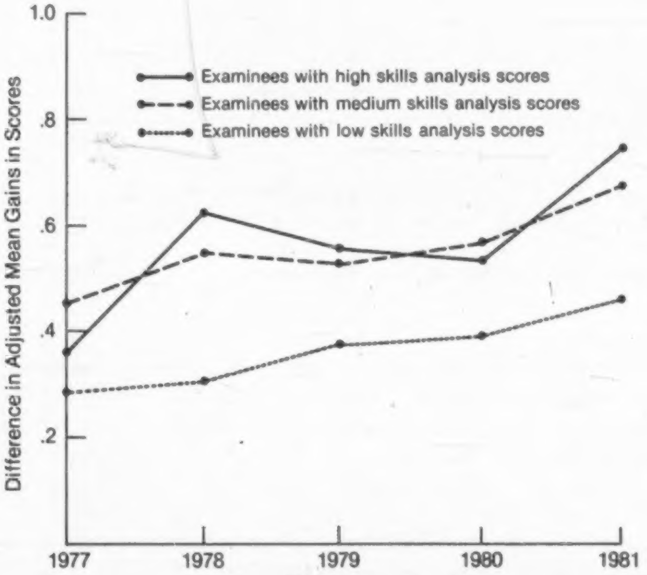

FIGURE 1

Differences in adjusted mean gains in scores of 4,074 coached repeat examinees on Science Knowledge and Science Problems subtests of the Medical College Admission Test (MCAT), compared with 14,524 uncoached repeat examinees, by level of examinees' scores on the Skill Analysis: Reading and Skills Analysis: Quantitative subtests of the MCAT, 1977 through 1981 (for explanation of adjusted scores and the three skills analysis groups, see text).

Coached examinees in each skills analysis group tended to outperform uncoached examinees, as indicated by a positive difference across groups and samples. The differences were consistently smaller for the low-skills score group than for the medium- and high-skills score group.

Coaching and First-Time Examinees

In the second study, the effect on performance of taking a commercial coaching course was investigated using data on examinees taking the test for the first time.

METHOD

Since examinees themselves choose whether or not to participate in commercial coaching courses, this study required finding a way to control for prior differences in ability and achievement between those who had enrolled in the course and those who had not. Two measures were used: undergraduate GPA and "selectivity" of undergraduate college. Both have been shown to correlate strongly with MCAT scores, and their use together provided an estimate of the examinee's expected level of performance on the MCAT (13).

The population consisted of all 1981–82 medical school applicants ($n = 22{,}618$) who took the MCAT for the first time in 1980. These applicants were classified using three variables: undergraduate GPA, selectivity of undergraduate college, and participation in a commercial coaching course prior to their first MCAT administration. Missing data on one or more of these variables reduced the population size to 19,564. Data on MCAT scores (first administration), undergraduate GPA, and undergraduate college attended were obtained from the files of the American Medical College Application Service (AMCAS). Selectivity of undergraduate college was determined by using the Astin index (14), which is the average SAT score of entering freshmen to each college and university. Colleges with very high selectivity were defined as those whose entering freshmen averaged 1182 or better on both parts of the SAT. High selectivity colleges were those whose freshmen averaged between 1037 and 1182 on the SAT. Medium selectivity colleges had averages between 893 and 1036, while low selectivity colleges had averages less than 893. The rationale and procedures used to group colleges in this way are described elsewhere (14). Information regarding participation in a coaching course was based, as in the first study, on a questionnaire item administered subsequent to each MCAT examination.

Within each of the 32 cell matrix formed by GPA (eight levels) and college selectivity (four levels), MCAT mean scores were computed for coached and uncoached examinees, and the differences in these mean scores were derived. Because the data were based on a population of applicants rather than a sample, statistical tests of significance were not applicable. Instead, the mean differences were examined for trends in their magnitude and pattern.

RESULTS

Table 2 shows the differences in average scores of the coached and uncoached groups by level of GPA, and Table 3 shows the differences by college selectivity. In Table 2, college selectivity was controlled by giving equal weight to the differences between groups at each of the four levels of selectivity. Similarly, in Table 3, undergraduate GPA was controlled by giving equal weight to the differences between groups at each GPA level. Each of these two tables shows an overall average difference for each MCAT subtest

TABLE 2

Differences in Average Scores of Coached and Uncoached First-Time Examinees on the Medical College Admission Test (MCAT), by Examinees' Undergraduate Grade-Point Averages (GPA), Based on Records of 19,564 Applicants to 1981–82 Entering Class*

MCAT Subtests	Undergraduate GPA†								Average Across GPA Groups
	0–2.50	2.51–2.80	2.81–3.00	3.01–3.20	3.21–3.40	3.41–3.60	3.61–3.80	3.80–4.00	
Science Knowledge									
Biology	.24	.15	.27	.58	.58	.60	.31	.42	.39
Chemistry	.32	.26	.16	.33	.39	.47	.17	.09	.28
Physics	.31	.40	.29	.57	.58	.44	.40	.43	.43
Science Problems	.23	.22	.14	.35	.35	.46	.17	.20	.26
SA: Reading	−.34	.02	−.08	−.06	−.12	.05	−.18	−.16	−.13
SA: Quantitative	.07	−.09	−.03	0	−.12	.02	−.08	−.15	−.05

* In computing these differences, equal weight was given to examinees from colleges with different levels of selectivity. A positive difference indicates a higher mean score for those enrolled in commercial coaching courses.

† For MCAT Science Knowledge and Science Problems subtests, undergraduate science GPA was used; for skills analysis subtests, undergraduate total GPA was used.

TABLE 3

Differences in Average Scores of Coached and Uncoached First-Time Examinees on the Medical College Admission Test (MCAT), by Level of Selectivity of Examinees' Undergraduate Colleges, Based on Records of 19,564 Applicants to 1981–82 Entering Class*

MCAT Subtests	Levels of College Selectivity				Average Across Selectivity
	Low	Medium	High	Very High	
Science Knowledge					
Biology	.43	.40	.48	.26	.39
Chemistry	.42	.20	.44	.04	.28
Physics	.43	.39	.59	.30	.43
Science Problems	.42	.20	.36	.07	.26
SA: Reading	−.10	−.21	−.06	−.13	−.13
SA: Quantitative	.07	−.09	−.07	−.10	−.05

* In computing these differences, equal weight was given to examinees at different levels of GPA. A positive difference indicates a higher mean score for those enrolled in commercial coaching courses.

across the undergraduate GPA and college selectivity categories.

The differential impact of commercial coaching courses on MCAT Science Knowledge and Science Problems subtests versus the Skills Analysis subtests is clear from the overall averages, and these figures support the findings of the first study. Differences on the Science Knowledge and Science Problems subtests ranged from .26 to .43 and favored coached applicants. However, the differences were trivial for the SA: Reading and SA: Quantitative subtests and tended to favor the uncoached group.

The differences by GPA level suggested that coaching courses had a somewhat smaller effect on the performance on the Science Knowledge and Science Problems subtests for applicants with low

GPAs (0–3.0) and applicants with very high GPAs (3.6–4.0). The differences by college selectivity suggested that coaching courses tended to have a smaller effect on performance on the Science Knowledge and Science Problems subtests of applicants from very selective undergraduate colleges than of those from other types of colleges.

Discussion and Interpretation

Both of the studies described here showed differences in scores of examinees on the MCAT Science Knowledge and Science Problems subtests that were at least associated with, if not due to, the examinees' taking commercial coaching courses. The study of first-time examinees showed slightly smaller differences than the study of test repeaters. Although this may be due simply to methodological differences between the studies, one might hypothesize that examinees who have taken the test and received a report of their deficiencies might use coaching courses more efficiently to remedy areas of weakness. The failure to find differences in SA: Reading subtest scores in either study and the small, unreplicated differences in SA: Quantitative subtest scores suggest that commercial coaching courses for the MCAT benefit examinees primarily by providing a structured review of the science content. Demonstration of this point requires a more focused study than the ones reported here. However, the other potential components of coaching courses—supplying correct answers, test-taking practice, maximizing motivation, controlling test anxiety, and instructing in test-taking skills—would be expected to affect all MCAT scores equally. If instruction and review are primarily responsible for the effects of coaching on MCAT scores, the courses are more appropriately described as science review programs, a term with less negative connotations.

The smaller differences in scores on the Science Knowledge and Science Problems subtests found for examinees with low scores on the SA: Reading and SA: Quantitative subtests provide serendipitous evidence of the validity of these latter two MCAT subtests. The rationale behind the development of these subtests was that the medical student and the physician, faced with a burgeoning body of scientific literature, should possess the analytical skills necessary to evaluate scientific findings critically and apply them to patient care. These same skills are, plausibly, involved in an effective review of the many and diverse science topics covered by the MCAT. They enable students preparing for the test to sift out the relevant from the irrelevant and to find and focus on the major points in each area. More data on the predictive validity of scores on the SA: Reading and SA: Quantitative subtests need to be examined. However, if these subtests are useful indicators of who will benefit from short-term MCAT review programs, they may also identify candidates who would benefit from special premedical and medical school programs, for example, science enrichment programs for minorities and others whose recruitment and retention in medical school are desired. The findings also suggest that students preparing for medical school might be aided by long-term programs that develop the skills these subtests measure.

The findings that those with very low GPAs benefited less from coaching courses in terms of their performance on the Science Knowledge and Science Problems subtests may be related to the differences by level of scores in the Skills Analysis subtests. The students' low GPAs demonstrate that they had learned less from college course instruction than students with high GPAs. Therefore, it follows that they might also learn less in a short-term review. By this logic, students with the highest GPAs should have improved their performance the most by taking a coaching course. However, it is likely that the effects of coaching courses for these students were muted by a "ceiling effect." Many of them scored at a level that left little room for improvement within the confines of what the test measures. The same ceiling effect may also have reduced the score improvement of applicants from very selective colleges who took a commercial coaching course.

Although the significance tests provided evidence of performance differences between coached and uncoached examinees, the substantive importance of these differences must be evaluated by other means. The magnitude of the coaching differences cast in standard deviation units tends to be somewhat smaller than that reported in Scott and colleagues' (6) NBME study. MCAT average score differences of one-half point are equivalent to .2 to .3 standard deviation units. Scott's study reported differences on the NBME examination that were equivalent to .4 standard deviation units. Under Cohen's (15) model for classifying effect sizes, the differences reported in the present study would be described as "small."

Neither of these interpretations provides specific guidance to the student or the premedical adviser who questions whether or not a coaching course is really worthwhile. For them, the ultimate criterion for assessing the effect of coaching is its impact on medical school acceptance. In many cases, it is difficult if not impossible to establish whether taking a review course really made the difference in a student's being accepted. MCAT scores are only one criterion medical schools use to evaluate applicants and tend to be less important than either college grades or the interview (16). By relating MCAT scores to acceptance decisions, the question can be addressed in general probability terms: To what degree do MCAT score differences of the magnitude found between coached and uncoached examinees alter a student's chances of being accepted?

Figure 2 presents data bearing on this question. The percentage of accepted applicants in 1982–83 was plotted against average MCAT scores in the Science Knowledge and Science Problems subtests. The double weighting of Science Problems subtest items in this averaging should again be noted. The acceptance figures ranged from 4 percent of the students with an MCAT score of 3 to 97 percent for an MCAT score of 14. The plot produced an S-shaped curve showing that differences in MCAT scores in the middle ranges of the scale more critically affected admissions decisions than those same differences at either extreme of the MCAT scoring scale. A half-point difference in the average scores on the Science Knowledge and Science Problems subtests occurring in the 7.5 to 8.0 range resulted in a difference of 8 percentage points in the probability of being accepted (41 percent compared with 33 percent). A change of this magnitude had less impact if it occurred for an examinee at the lower or the upper end of the scale. The curve tends to overestimate the importance of MCAT score differences alone. Correlation between undergraduate GPA and MCAT scores causes the curve to rise more steeply than it would based on MCAT score differences alone. The higher acceptance rates at higher MCAT score levels reflects in part the higher grades of students at these levels. There-

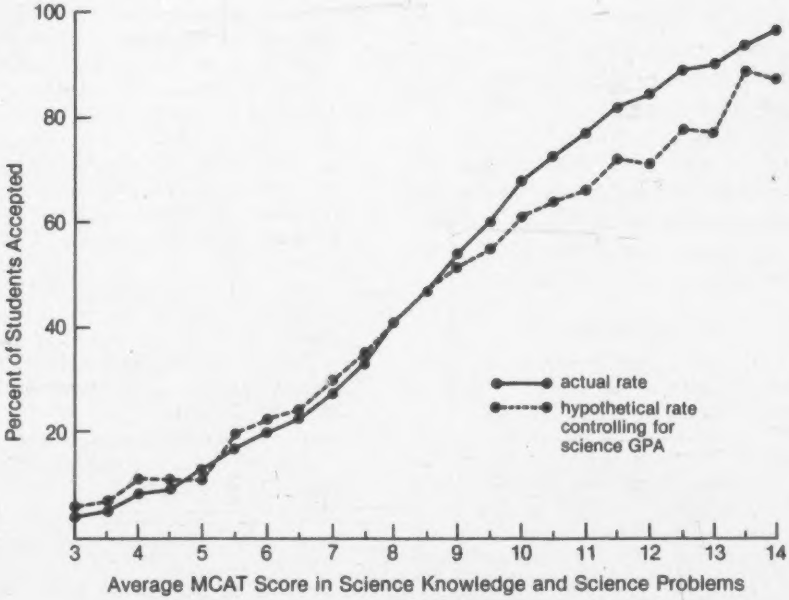

FIGURE 2
Acceptance rates of 36,023 medical school applicants for 1982–83, by average scores on the Science Knowledge and Science Problems subtests of the Medical School Admission Test (MCAT) (for explanation of controlling science GPA, see text).

fore, for comparison, Figure 2 also shows a hypothetical curve demonstrating changes in acceptance rates by MCAT score levels with science GPA controlled; that is, acceptance rates within each category of GPA were averaged to produce an acceptance rate for each score level. The hypothetical curve exhibits a more moderate slope. Differences in acceptance rates at critical points in the middle range between MCAT score levels a half-point apart did not exceed 5 percentage points and were generally less.

Conclusion

The two studies reported here suggest that commercial coaching courses do have an effect on performance on the MCAT. However, this effect was limited to certain MCAT subtests, was small, and was likely due to the science review component of MCAT coaching programs. It would be desirable for these results and their interpretation to be validated by smaller scale studies that gather more detailed data on the amount of time coached and uncoached examinees spend on test preparation, that describe more specifically the nature of the coaching that students receive, and that permit a random selection of students and a random assignment to programs. Unfortunately, this last feature would be exeedingly difficult to implement.

The studies reported in this paper address only some of the questions which arise from the coaching issue (17). Further research is needed to assess more clearly the implications of coaching for the predictive validity of the MCAT. Information is needed on the extent to which the time that college students spend in commercial coaching courses and individual preparation for the MCAT detracts from their pursuit of a broad undergraduate education. Clearly the issues surrounding coaching cannot be resolved by data-oriented studies alone but well designed studies should provide data for an informed discussion of the issues.

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Race and Socioeconomic Status In Medical School Choice and Indebtedness

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and Sara L. Thran

Abstract—Current and proposed cutbacks in student financial assistance may significantly reduce the likelihood that low-income and minority individuals will be able to pursue a medical career. In order to estimate the magnitude of the potential effects of these cutbacks, the authors of the study reported here examined the effectiveness of the federal health manpower programs of the 1960s and 1970s in increasing access to medical education. The results suggest that regardless of race or ethnic background individuals from families with small resources were able to enter even the most expensive medical schools without incurring substantially greater debt than individuals with more family resources. In addition, the debt burden of the minority physicians examined was not very different from that of nonminority physicians. Thus, the health manpower programs appear to have been very effective, and their elimination should have a larger adverse effect on low-income individuals than on high-income persons.

Health manpower programs during the late 1960s and the 1970s made it possible for low-income and minority individuals to afford a medical education. These programs, such as the Health Professions Student Loan Program and the Scholarship Program for First-Year Students of Exceptional Financial Need, sharply reduced the costs of an individual's education. Studies have found that, as a result, some progress was made in increasing access to medical training for minority and poor individuals (1–3). Recently, however, substantial tuition increases occurred concurrently with reductions in the level of state and federal educational support, and early evidence suggests that enrollment in predominantly black medical schools have decreased (1, 3).

Since access to medical education concerns policymakers and the medical profession, it is important to determine the extent to which current and proposed cutbacks in student financial assistance will reduce the likelihood that low-income and minority individuals will be able to pursue a medical career. One way to address this issue is to examine the effectiveness of federal health manpower programs during the 1960s and 1970s. If

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these programs were effective, their elimination will have a large detrimental effect on access to medical training. The authors of the study presented here report the results of an examination of the medical school education and indebtedness of medical residents in 1983. In particular, two questions were examined: What medical schools did minority individuals and those with limited resources attend? How much debt did these individuals incur?

A number of earlier studies and reports examined data relevant to these questions but not at the level of detail of this study. In particular, prior work on minority physicians pertained to patterns of enrollment and indebtedness across racial groups (1, 3–6). The authors of the present study, however, examined not only differences across racial lines but also differences by race while controlling, at least in part, for family socioeconomic status.

Method

Data used in this analysis came from the 1983 Survey of Resident Physicians conducted by the American Medical Association (AMA) (7). The survey was designed to collect socioeconomic data from a representative sample of resident physicians in all years of training. Questionnaires were mailed to approximately 14,000 residents in 1983, and completed surveys were returned by 5,887 (45 percent). The authors of the present study examined the responses of those residents who had graduated from U.S. and Puerto Rican medical schools.

Questions on educational background and personal characteristics appeared in the AMA survey, and the residents were asked about the amount of debt they accumulated during their premedical and medical education. In addition, they were asked to designate their race or ethnic background as Asian/Pacific islander, black, Hispanic, white, or other. The authors of the present study grouped together those residents who described themselves as black or of Hispanic background and referred to this group as minority residents. Residents who reported their race as white were defined to be nonminority residents. The sample used for the present study consisted of 254 minority and 4,164 nonminority residents who had graduated from U.S. and Puerto Rican medical schools primarily from 1976 through 1982. Thus, a total of 1,469 residents who graduated from Canadian or foreign medical schools or who reported their race as Asian/Pacific islander or other were excluded.

In order to examine fully the influence of past health manpower programs, the authors needed a control group for family socioeconomic status, since individuals with limited resources have a greater need for these programs. The 1983 AMA survey of residents contained information that could be used to determine the family socioeconomic status of the resident—the educational attainment of the resident's mother and father. The minority and nonminority residents were thus divided into two groups according to the educational attainment levels of their parents: (*a*) residents whose mothers and fathers both had high school education or less and (*b*) residents whose mother or father had at least some college training. Residents in the former group were assumed, on average, to come from a low socioeconomic strata (low SES), whereas those in the latter group were assumed to come from a higher socioeconomic strata (high SES). Among the residents examined, 45.1 percent of the black and Hispanic residents had families in the low SES group, and 22.9 percent of the nonminority residents had families in the low SES group.

The medical schools attended by residents in the AMA survey were classified by type in order to examine the influence that race and parents' education had on medical school choice. Three types of medical schools were distinguished: public U.S. and Puerto Rican medical schools; private U.S. and Puerto Rican medical schools, excluding the three predominantly black medical schools (that is, Howard University College of Medicine, Washington, D.C.; Meharry Medical College School of Medicine, Nashville, Tennessee; and Morehouse School of Medicine, Atlanta, Georgia); and private, predominantly minority schools, consisting of Howard, Meharry and Morehouse.

Results and Discussion

Table 1 reports the distribution of the residents by parental education and by the type of medical school from which the residents had graduated. Overall, the distribution of minority residents and that of nonminority residents were significantly different. This difference was due to the large proportion of black residents within the minority category (around 23 percent) who graduated from the predominantly black medical schools. This percentage was comparable with those presented in Sullivan (1) and in an unpublished study by Dr. Ruth Hanft for the Association of Minority Health Professions Schools (AMHPS) in 1983.

The distribution of minority and nonminority residents across types of medical schools was fairly similar for both SES categories, and statistical tests confirmed that these distributions were not statistically different. Thus, individuals from families with low SES attended the rela-

TABLE 1

Percentages of 254 Minority and 4,164 Nonminority Resident Physicians Responding to 1983 Survey, by Type of Medical School Attended and by Parents' Education

Race/Schools	Total	Parents' Education†	
		High School or Less	Some College
Minority*			
Public	55.4	58.7	52.6
Private—nonminority‡	32.6	32.1	33.1
Private—minority§	12.0	9.2	14.3
'Top ten'**	13.6	13.0	14.3
Nonminority*			
Public	59.8	60.5	59.6
Private—nonminority‡	40.2	39.5	40.4
Private—minority§	††	0.0	††
'Top ten'**	8.1	6.1	8.8

* Minority residents were those who defined themselves as blacks and Hispanic persons. Nonminority residents were those who defined themselves as white.

† The authors used parents' education as the measure of the socioeconomic status of resident's family.

‡ Private U.S. medical schools except the predominantly black medical schools of Howard University College of Medicine, Meharry Medical College School of Medicine, and Morehouse School of Medicine.

§ Private, predominantly black U.S. medical schools: Howard University College of Medicine, Meharry Medical College School of Medicine, and Morehouse School of Medicine.

** 'Top ten' medical schools as rated by Cole and Lipton (8).

†† Less than 0.5 percent.

tively more expensive private medical schools in similar proportions to their racial and ethnic counterparts with high SES.

Table 1 reports another indicator of access to medical education: the proportion of residents who attended the 10 medical schools with the highest reputations as measured by Cole and Lipton (8). Several implications can be drawn from these data. First, low family socioeconomic status of minority residents has not been a deterrent to attendance at these highly rated schools. The proportion of minority residents who had graduated from the "top 10" schools and whose families had a low SES (13.0 percent) was not significantly different from that of minority residents with a high SES (14.3 percent) who had attended the 10 schools. However, the same was not true for nonminority residents. Significantly fewer nonminority residents who had a low SES graduated from the top rated medical schools compared with those with high SES (6.1 versus 8.8 percent).

Another finding shown in Table 1 is that a larger proportion of minority residents graduated from the 10 top-rated medical schools than nonminority residents, almost 14 percent compared with 8 percent. One factor in particular may help explain this result. Minority individuals may prefer urban settings for their medical education, because more frequently than nonminority individuals they have been raised in urban areas. Nine of the 10 top-rated medical schools are located in metropolitan areas.

Though it appears that low socioeconomic status has not been a major barrier to the type of medical school attended, it is important to consider the cost that this training imposes on these individuals. As noted previously, earlier studies have suggested that minority individuals and those with few family resources accumulate substantially more debt. In particular, Flamer and colleagues (9) suggested that minority medical students will accumulate twice as much debt as nonminority students over the course of their medical education.

Table 2 presents data on educational debt accumulated during medical school by the resident's personal background and type of medical school attended. The latter distinction was examined because the costs of medical education vary considerably between public and private schools. Within each category of medical school, there were no significant differences in either the percentage of residents with debt or the mean level of debt when minority residents as a group were compared with nonminority residents. Thus, the minority residents overall did not appear to have a significantly larger debt burden than nonminority residents who had graduated from the same kind of school.

Within the minority and nonminority subgroups, however, were significant differences in indebtedness. In particular, those residents who had graduated from public medical schools and who had a low SES more frequently had medical education debt when compared with those with high SES, regardless of race or ethnic group. In addition, nonminority residents who had graduated from the private, nonminority medical schools and who had a low SES more frequently had debt than nonminority residents with high SES from these schools. Finally, the average debt of nonminority residents from the private, nonminority schools with low SES was significantly greater than the average debt of nonminority residents from these schools with high SES.

The results for the 10 top-rated medical schools were, however, very different

TABLE 2

Percentage of 254 Minority and 4,164 Nonminority Resident Physicians with Medical Education Debt and Mean Debt (in Dollars), by Type of Medical School Attended and Parents' Education, 1983*

	Minority Residents						Nonminority Residents					
			Parents' Education						Parents' Education			
Type of Medical School	Total		High School or Less		Some College		Total		High School or Less		Some College	
	Percent Debt	Mean Debt†	Percent Debt	Mean Debt†	Percent Debt	Mean Debt†	Percent Debt	Mean Debt†	Percent Debt	Mean Debt†	Percent Debt	Mean Debt†
Public	77.6	17,100	89.0	18,000	67.1	16,000	72.4	16,000	82.5	17,000	69.3	15,700
Private—nonminority	75.3	20,400	82.9	22,300	70.5	18,500	70.6	20,400	82.3	21,600	67.2	19,900
Private—minority	79.3	16,100	80.0	22,000	78.9	13,000	‡	‡	§	§	‡	‡
'Top ten'	77.1	17,900	93.3	15,900	65.0	20,000	66.8	18,000	71.2	19,400	65.7	17,700

* For explanations applicable to table, see footnotes to Table 1.

† Mean debt in dollars computed only with those residents who incurred debt.

‡ Only two residents are in this category. This sample size is too small to compute a statistically reliable mean.

§ No residents in this category.

from the results of the other categories of schools. First, there was very little difference in the percentage of nonminority residents with debt across SES categories. Second, although minority residents with low SES appeared more likely to have taken educational loans, they needed to borrow less than minority residents who came from high SES families. The small cell sizes in the analysis preclude an estimate of the significance of these differences, but the differences are suggestive in light of the results in Table 1. The top 10 schools may have very effective support programs for minority and low-income individuals.

The data reported in Table 2 demonstrate that the government assistance programs to assist needy individuals in financing medical education have been successful at holding down an individual's education cost in some types of medical schools. Thus, it appears that access to even the more expensive medical schools did not result in excessively higher debt burdens for students with limited resources.

Table 3 reports debt accumulated during medical school by source; that is, loans under the Guaranteed Student Loan (GSL) Program, National Direct Student Loan (NDSL) Program, Health Professions Student Loan (HPSL) Program, Health Education Assistance Loan (HEAL) Program, and "other" sources. The sources of medical education debt varied primarily by SES category. Within each racial and ethnic subgroup, residents from low SES families had significantly more NDSL and HPSL debt. This variation in source of debt is consistent with the findings of Flamer and colleagues (9) and with expectations, since national direct student loans and health professions student loans can be obtained only if financial need is demonstrated (10, 11). Since loans under the NDSL program have much lower rates of interest than loans under the GSL and HEAL programs, the results in Table 3 suggest that the differences in debt between residents from low SES and those from high SES families overestimate the true difference in debt burden. Medical school graduates

TABLE 3

Average Medical Education Debt (in Dollars) of 254 Minority and 4,164 Nonminority Resident Physicians, by Loan Source and Parents' Education, 1983*

Source	Minority Residents			Nonminority Residents		
	Total	Parents' Education		Total	Parents' Education	
		High School or Less	Some College		High School or Less	Some College
GSL†	7,100	7,400	6,900	8,900	9,100	8,800
NDSL‡	2,000	2,400	1,600	1,500	2,000	1,300
HPSL§	3,800	4,600	3,100	2,000	2,600	1,800
HEAL**	1,000	1,200	800	600	700	600
Other	4,000	4,100	3,800	4,800	4,400	4,900
Total	17,900	19,700	16,200	17,800	18,800	17,400

* For explanations applicable to table, see footnotes to Table 1.

† GSL = Guaranteed Student Loan Program.

‡ NDSL = National Direct Student Loan Program.

§ HPSL = Health Professions Student Loan Program.

** HEAL = Health Education Assistance Loan Program.

from families with fewer resources will tend to have lower loan repayments per dollar of debt, since more of their debt comes from the sources with lower interest rates.

When premedical education debt is added to the medical education debt that was reported in tables 2 and 3, the authors found similar results to those reported above for debt accumulated strictly during medical school. In particular, 92.9 percent of the minority residents and 88.2 percent of nonminority residents from a low SES had debt, whereas the comparable proportions for high SES residents were only 79 percent of minorities and 72.3 percent of nonminorities. In addition, residents from low SES families had a significantly higher level of total premedical and medical debt for each of the racial and ethnic groups. Minority residents as a group more frequently had debt than nonminority residents, but the mean level of total premedical and medical debt was not significantly different across the racial and ethnic groups ($26,000 for minorities and $25,400 for nonminorities).

These results are in sharp contrast to those of another study that found that black medical students overall had substantially more educational debt from medical schools when compared with white students (9). The results of the present study suggest that debt varied by family resources rather than by racial and ethnic groups. In addition, differences in indebtedness by family SES were not as large as might be expected. Data from Table 3 indicate that debt from medical school of minority residents with a low SES was only 22 percent greater on average than medical school debt for minority residents from a high SES, while nonminority residents from a low SES had a medical school debt that was only 8 percent greater than nonminority residents from a high SES, Also, these differences overestimate the difference in total debt burden, since residents with limited resources more frequently have highly subsidized loans.

Conclusion

The overriding conclusion from the results is that the health manpower programs of the 1960s and 1970s were fairly successful at making attendance at even the more expensive medical schools affordable for those with limited resources. Within racial and ethnic groups, there were no significant distributional differences in the type of medical school attended in terms of family socioeconomic status. However, this distribution varied over racial and ethnic groups mainly because of the large proportion of black residents within the minority group who attended the predominantly black medical schools. On the other hand, the extent of educational indebtedness varied primarily by family SES and not by race or ethnicity. Even though resident physicians with fewer resources had significantly more debt, the differences in debt load by SES were much smaller than anticipated. Also the differences in debt burden across the socioeconomic groups was overstated to some extent, since residents with limited resources more frequently had debts at lower interest rates.

These findings have a variety of policy implications, especially in light of actual and proposed changes in federal funding for medical education. The federal government has reduced the total amount of money for educational loan programs. Although the government has increasingly directed funding toward individuals in low SES families, the access of these families to low interest educational loans has declined. The results of the study reported here indicate that these changes would have a large impact on access to medical education. The federal loan programs for health education appear to have been very effective at holding down an individual's cost of medical training. Because of the reductions in these programs, then, the cost of this training may increase dramatically for individuals from low income families. It seems likely that many individuals from these families would no longer be able to afford a medical education under these circumstances.

Increased access to medical education and to educational assistance for minority and low-income individuals has two major benefits for society. In the first place, increased access fosters an environment in which all individuals, regardless of race, ethnicity, or family income, can achieve their fullest potential. Second, the influx of minority and low-income individuals into medicine has helped relieve the maldistribution of physicians in certain areas of the country. Minority and low-income individuals more frequently select primary care specialties and practice in underserved locations (12–14). Policymakers must carefully weigh these benefits as they consider further changes in the federal funding of loan programs for the health professions.

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Evaluation of Ambulatory Care Training By Graduates of Internal Medicine Residencies

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Abstract—In 1984, 154 physicians who had completed residencies in internal medicine at 15 major teaching hospitals in 1982 evaluated their residency training in ambulatory care. A majority of the physicians would have liked more experience in practical areas related to career planning and office management, more input from subspecialties such as orthopedics and dermatology, greater knowledge about the management of psychosocial problems, and more information about exercise and nutrition. Although many physicians also wanted more time devoted to several other topics, less than 20 percent recommended spending less time on 26 of the 27 topics being evaluated. Since these recommendations are similar to those reported in evaluation studies published over the past 25 years, it appears that training programs in internal medicine have not been successful in restructuring their curricula to meet many of the needs of practicing physicians.

During the past 25 years a number of studies of former residents' evaluations of their postgraduate training in internal medicine and pediatrics have been published. Most have been studies of the graduates of a single training program (1–5), but some have studied graduates on a regional or statewide basis (6–7). Evaluations of individual residency programs have been useful in that the investigators often examined specific components of a program, thereby providing detailed information to training program directors. More broadly based studies tended to pay less attention to specific aspects of programs but provided more generalizable information. In spite of the size or number of the programs evaluated, published reports since the 1960s have several recurring findings: graduates want more training in subspecialty ambulatory care; more training in common ambulatory problems, particularly psychosocial problems; and more frequent interactions with faculty members.

Because of the absence of national studies of recent alumni of residency training programs and the importance of assessing the needs and opinions of practicing physicians, the authors of the present paper undertook a study of the graduates of 15

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internal medicine programs. (The study was part of a comprehensive evaluation of the primary care group practices of departments of medicine in the 15 major teaching hospitals carried out by the authors). In 1984 all physicians who had completed internal medicine residency training in the 15 hospitals in July 1982 and who had spent an average of half a day per week in the group practice were asked to participate.

The first purpose of the study reported here was to obtain these physicians' opinions of specific aspects of their training in ambulatory care, particularly the content, skills, and rotations that should or should not have been routinely provided. Ambulatory care was the focus of this evaluation because of the increasing interest of society in keeping patients out of hospitals and because after training physicians spend the vast majority of their time providing outpatient care. However, for purposes of comparison, several inpatient rotations were also evaluated here. A second purpose was to compare levels of job satisfaction and work-related stress among these physicians two years after completion of their training with the levels expressed by internal medicine house staff members in the same hospital residency training programs in 1984. Although job satisfaction and work-related stress are frequently discussed in relation to medical training and practice, there have been relatively few empirical studies of either (8–15). Such information, together with physicians' opinions on the kinds of training that would have been more or less useful to them, should help directors of residency training programs make more knowledgeable decisions about the direction their ambulatory care programs should take or problems that need to be resolved.

Methods

Physicians who had spent an average of one half day per week in the primary care group practice and had completed residency training in internal medicine in July 1982 at 15 hospitals (a total of 234) were asked to complete self-administered questionnaires during April and May of 1984. Completed questionnaires were returned by 154 physicians (66 percent). Twenty-seven percent of the responding physicians were women, 71 percent were married, 41 percent had children, and 7 percent were of black, Hispanic, or Asian background.

The 15 teaching hospitals in the study were: Albany Medical Center Hospital, Albany, New York; Georgetown University Hospital, Washington, D.C.; the Johns Hopkins Hospital, Baltimore, Maryland; Medical College of Virginia Hospital, Richmond; Mount Sinai Medical Center, New York, New York; New England Medical Center Hospital, Boston, Massachusetts; North Carolina Memorial Hospital, Chapel Hill; St. Louis University Medical Center, St. Louis, Missouri; University of California, Los Angeles, Medical Center; University of California, San Francisco Ambulatory Care Center; University of Colorado Health Sciences Center, Denver; University of Medicine and Dentistry of New Jersey-University Hospital, Newark; Vanderbilt University Medical Center, Nashville, Tennessee; West Virginia University Medical Center, Morgantown; and Yale-New Haven Hospital, New Haven, Connecticut. Based upon data from the *'81–82 Directory of Residency Training Programs* (16) and the *1981 American Hospital Association Guide* (17), these hospitals did not differ significantly from other teaching hospitals in terms of total number of beds, average occupancy rate, annual number of admissions, annual live births, number of residency positions, annual number of admissions to the medical service, and number of outpatient visits to the internal medicine practice.

Six specific dimensions of job satisfaction were measured: (*a*) the status and prestige associated with work in ambulatory care (4 items); (*b*) the degree of perceived control in making administrative and organizational decisions (5 items); (*c*) social and interpersonal relations with other health workers (2 items); (*d*) the adequacy of available facilities and resources (5 items); (*e*) the diversity of the patient population served; and (*f*) the educational climate (2 items). An eight-item global satisfaction scale, which evaluated many specific dimensions of work, was also employed. Satisfaction scores were calculated for each of these seven scales by summing the responses to the individual items and then dividing this sum by the number of items in the scale. The scales met conventional standards of internal consistency reliability (alpha $\geq$ .5), and higher scores indicated greater satisfaction.

Two measures of work-related stress and conflict were used. The stress scale consisted of 10 problems rated on a 5-point continuum from never occurring (low scores) to occurring very often (high score). These problems included keeping up with the literature, meeting patients' needs and demands, solidifying goals for future education, mastering the knowledge base of medicine, being clinically competent, getting along with others, maintaining self-confidence, making good clinical judgments, making decisions about where to practice, and finding time to spend with friends and family. The conflict scale consisted of seven items measuring the degree of conflict between work and personal aspects of life, evaluated on the same 5-point continuum. Both scales met conventional standards of reliability, and higher scores indicated greater stress or conflict.*

The sample of residency graduate physicians was also surveyed on 27 content or skills areas in ambulatory care training and was asked whether more training time should have been spent in each activity, the time devoted was about right, less time should have been spent, or no time at all should have been spent. In addition, the physicians were asked to evaluate the nine clinical rotations in their residency training and eight innovations designed to increase the educational value of the residency program in terms of the degree to which the innovation would have added to or detracted from their overall education. The physicians also indicated the extent to which their experience in the internal medicine group practice during residency influenced the kind of medical career they planned to pursue. They were also asked how they divided their time among various work activities in their practices, to describe their practice setting, and to indicate how many hours they worked in an average week.

All internal medicine house staff members spending one-half day or more per week in the group practice in the 15 teaching hospitals in 1982 (750 residents) and in 1984 (785 residents) at the time completed questionnaires measuring job satisfaction, work-related stress and conflict, and attitudes toward the eight educational innovations in ambulatory care training. The response rate of the 1982 sample was

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* The specific items and frequency distributions are available from the authors.

88 percent (n = 660), and the response rate of the 1984 sample was 80 percent (n = 628). Data pertaining to these residents were compared with the responses of the 154 residency graduate physicians.

Results

At the time of the survey in 1984, almost half of the 154 responding residency graduate physicians were in subspecialty training (45 percent), and an additional 14 percent were involved in research fellowships. Nine percent were in private practice, 8 percent were working in emergency rooms, 11 percent were in full-time salaried positions in nonacademic settings (such as health maintenance organizations and clinics), 4 percent were full-time faculty members in teaching hospitals, and 8 percent were in other positions.

The physicians reported that their most time-consuming activity was direct patient care, estimated to take 52 percent of their time. Research was the next most time-consuming (21 percent), followed by reading (10 percent), house staff supervision (9 percent), administration (4 percent), and classroom teaching (3 percent). The estimated number of hours worked averaged 59 per week.

Table 1 lists the physicians' opinions on the content areas and skills they thought should be included in internal medicine residency training. A majority indicated that the following eight content areas or skills deserved more attention during their residency training: office orthopedics, office dermatology, office management, sexual dysfunction, nutritional counseling, management of depression, career counseling, and developing exercise programs. The physicians were extremely reluctant to recommend that less or no time be spent on training pertaining to the skills and activities. However, some physicians recommended reducing or eliminating training in use of the problem-oriented medical record, family or behavior therapy, and communication skills.

Table 2 shows the graduate physicians' evaluations of the clinical rotations during their residency. Eighty percent or more indicated that the time allocated to inpatient wards, the intensive care unit, the critical care unit, and the emergency room had been about right. However, 34 percent felt that more time should have been spent in subspecialty clinics, while others thought that less or no time should have been spent on student health (44 percent), on family planning (30 percent), and in out-of-hospital rotations (20 percent). Although 72 percent felt that time spent in the general internal medicine clinic was about right, 18 percent favored more time, and 11 percent recommended less time.

Table 3 lists the graduate physicians' evaluations of the eight proposed educational innovations in internal medicine training. The most favorably endorsed innovations were to increase the number and availability of attending physicians, (70 percent), of subspecialists (68 percent), and, to a lesser extent, of social workers, pharmacists, and nutritionists (64 percent). There was less consensus that increasing the amount of appointment time spent with each patient and increasing exposure to psychosocial and health maintenance issues would have been helpful. The physicians were also divided in their opinion regarding increasing the availability of nurse practitioners, increasing the amount of time spent in clinic, or increasing their case load of patients.

Table 3 also includes the questionnaire responses of the 628 responding residents who were in the same 15 residency programs in 1984. Generally, the residents

TABLE 1

Percentages of 154 Physicians Who Completed Internal Medicine Residencies in 1982 Rating the Amount of Time Spent on 27 Ambulatory Care Activities During Residency Training, 1984

Content Areas and Skills	More Time Needed	Time About Right	Less Time Needed	No Time Needed
Office orthopedics	78	17	0	5
Office dermatology	72	25	2	1
Office management	71	24	1	4
Sexual dysfunction	55	43	1	1
Nutritional monitoring and counseling	53	41	3	3
Career counseling	57	35	3	5
Managing depression	50	43	5	2
Pelvic examination	41	58	2	0
Managing anxiety	44	52	3	1
Cost containment	44	51	3	2
Developing exercise programs	55	35	3	7
Use of community resources	44	50	4	2
Eating disorders	43	51	4	2
Sensitivity and specificity of tests	33	61	5	1
Monitoring quality of care	35	56	7	1
Physician impairment and burnout	43	45	4	9
Drug abuse	27	66	6	1
Dealing with the suicidal patient	32	59	7	2
Suturing	37	52	4	7
Use of paraprofessionals	29	61	7	3
Brief psychotherapy	38	46	7	9
Alcoholism	20	69	11	0
Relaxation training	42	37	8	13
Communication skills	25	57	10	8
Behavior therapies	30	49	11	11
Family therapy	26	55	9	11
Use of problem-oriented record	5	68	25	3

and the graduate physicians held similar opinions about the proposed educational innovations, although some differences emerged. A greater percentage of the graduate physicians felt that increasing the number of patients seen would have been helpful (30 percent as opposed to 10 percent). On the other hand, a greater percentage of the residents felt that increasing the amount of appointment time spent with each patient would have been helpful (67 percent as opposed to 44 percent).

Table 4 shows the physicians' mean scores on the job satisfaction, work stress, and conflict scales and the comparable scores for the 1984 residents. Generally, the graduate physicians were satisfied with most dimensions of their work. The mean score on only one job satisfaction dimension was below the 3.0 midpoint—satisfaction with participation in making

TABLE 2

Percentages of 154 Physicians Who Completed Internal Medicine Residencies in 1982 Rating the Amount of Time Spent in Nine Clinical Rotations During Residency Training, 1984

Rotation	More Time Needed	Time About Right	Less Time Needed	No Time Needed
Inpatient medical wards	5	85	10	0
Intensive care unit	6	86	7	0
Critical care unit	4	88	8	0
Emergency room	15	80	6	0
Subspecialty clinics	34	58	7	1
General internal medicine clinic	18	72	11	0
Student health	17	40	11	33
Family planning	32	38	7	23
Out-of-hospital rotations	28	52	7	13

TABLE 3

Percentages of 154 Physicians Who Completed Internal Medicine Residencies in 1982 and Percentages of 628 Internal Medicine Residents in the Same Residency Programs in 1984 Who Approved Eight Innovations in Ambulatory Care Training, 1984*

Innovation	Physicians	Residents†
Increase no. of patients	30	10
Increase no. of nurse practitioners	34	52
Increase no. of social workers, pharmacists, and nutritionists	64	71
Increase no. of subspecialists teaching in the training program	68	77
Increase clinic time	43	34
Increase contact with attending physicians	70	73
Increase appointment time spent with each patient	44	67
Increase exposure to psychosocial and/or health maintenance issues	48	62

* Respondents stated that the innovations would add somewhat or greatly to ambulatory care training.

† Sample was drawn from house staff members who spent an average of one-half day per week or more in the ambulatory group practice in each training site.

organizational and administrative decisions. Except for social and interpersonal relations, the graduate physicians were more satisfied on each dimension of work than were the residents. The physicians also indicated experiencing less job-related stress and conflict.

Because a vast majority of the graduate physicians in the sample had participated in the 1982 evaluation as senior residents, it was possible to compare their reports of work satisfaction, job stress, and conflict in 1982 with their responses in 1984. Table 5 shows mean scale scores for the 130 physicians who participated in both evaluations and indicates that their satisfaction increased significantly on most dimensions of work. Table 4 has shown that stress and conflict scores were lower among the graduate physicians than the 1984 residents. Table 5 shows that the physicians felt a significant reduction in

TABLE 4

Mean Scores of 154 Physicians Who Completed Internal Medicine Residencies in 1982 and Mean Scores of 628 Residents in the Same Residency Training Programs in 1984 on Measures of Job Satisfaction, Job-Related Stress, and Conflict Between Work and Personal Life, 1984*

Measures	Physicians	Residents†
Job satisfaction		
Status and prestige of ambulatory care work	3.42	2.83
Perceived control of administration and organization	2.97	2.49
Social and interpersonal relations with other health workers	3.29	3.30
Adequacy of facilities and resources	3.51	3.44
Diversity of patient population	3.53	3.33
Educational climate	3.57	2.78
Global satisfaction‡	3.13	3.01
Work-related stress	2.93	3.26
Conflict between work and personal life	2.67	2.78

* Higher scores = higher satisfaction, stress, or conflict. The number of items varied from scale to scale, but all were rated on a 5-point Likert scale.

† Sample was drawn from house staff members who spent an average of one-half day per week or more in ambulatory group practice in each training site.

‡ This scale included satisfaction items on relationships with other physicians and health workers, adequacy of available resources, educational climate, diversity of patient population, the appointment system, and salary.

TABLE 5

Mean Scores on Job Satisfaction, Job-Related Stress, and Conflict Scales of 130 Physicians* Recorded When They Were Senior Residents (in 1982) and Two Years After Residency Graduation (in 1984)†

Dimension	1982	1984
Job satisfaction		
Status and prestige of ambulatory care work	2.98	3.42‡
Perceived control of administration and organization	2.71	2.95‡
Social and interpersonal relations with other health workers	3.36	3.30
Adequacy of facilities and resources	3.28	3.52‡
Diversity of patient population	3.31	3.54‡
Educational climate	3.00	3.38‡
Global satisfaction§	3.10	3.13
Work-related stress	3.36	2.95‡
Conflict between work and personal life	2.68	2.66

* The difference between the 154 graduate physicians reported elsewhere in this study and the 130 reported here is due to nonresponse rates.

† Higher scores = higher satisfaction, stress, or conflict. The number of items varied from scale to scale, but all were rated on a 5-point Likert scale.

‡ Significant at $p = .01$ or greater.

§ This scale included satisfaction items on relationships with other physicians and health workers, adequacy of available resources, educational climate, diversity of patient population, the appointment system, and salary.

the level of work-related stress from that they reported during their last year of residency, but the level of conflict between work and personal life had not changed since their residency ended.

Although the study reported here was not designed to be a comprehensive analysis of factors associated with physician job stress, work satisfaction, or conflict, these variables can be examined in relationship to several demographic and work characteristics of the physicians.

Regarding work satisfaction measures, none was significantly correlated with the physicians' race, marital status, sex, number of children, number of hours worked per week, or percentage of time spent in administration, research, patient care, or reading. However, the physicians who had been members of special primary care training programs present in six of the training institutions were significantly more satisfied with the status and prestige associated with their work ($r = .221$, $p < .01$) and with the patient population they served ($r = .212$, $p < .01$) and had greater global job satisfaction ($r = .156$, $p < .05$) than physicians who received traditional internal medicine training. Also, the graduate physicians who in 1984 were spending less time teaching in the classroom or supervising house staff members (that is, those in private practice) were significantly more satisfied with the facilities and resources available to them ($r = -.219$, $p < .01$; $r = -.193$, $p < .02$) than were the physicians who spent more time in these activities.

Based upon analysis of variance, the physicians' work setting was found to be related significantly to their satisfaction with facilities and resources ($F = 2.22$, $p < .05$) and with their role in administrative and organizational decisions ($F = 5.18$, $p < .0001$). On both measures the physicians in private practice had the highest mean scores; those working in emergency rooms had the lowest.

With regard to measures of work-related stress and conflict between work and personal life, women as compared with men had higher stress scores ($r = -.160$, $p < .05$) and higher conflict scores ($r = -.166$, $p < .05$). Physicians with children had greater conflict between work and personal life than those with none ($r = .249$, $p < .002$). However, those physicians who were unmarried had significantly higher stress and conflict scores ($r = -178$, $p < .05$; $r = -.252$, $p = < .01$) than the married physicians. Also, higher conflict scores were found among graduates of the special primary care training programs than those traditionally trained ($r = .171$, $p < .05$) and among physicians who spent a greater percentage of their time teaching in the classroom ($r = 1.58$, $p < .05$). Finally, higher conflict scores were associated with a greater number of hours worked per week ($r = .236$, $p < .01$).

Discussion

In evaluating their previous internal medicine residency training in ambulatory care, a majority of the graduate physicians indicated four rather distinct areas in which they would have liked more experience: practical areas related to office management and career planning; subspecialties such as dermatology and orthopedics; psychosocial problems such as depression and sexual dysfunction; and nutritional monitoring and counseling and developing exercise programs. In addition, 20 to 44 percent of the physicians indicated that they thought more time should be devoted to other areas. Less than 20 percent of the graduate physicians recommended spending less time on 26 of the 27 activities they were asked to evaluate. This phenomenon of wanting more without an expressed willingness to make cuts elsewhere poses a continuing dilemma to medical educators who try to be responsive to the increasing and often changing needs of residents. In many training programs, each lunch hour is consumed by lectures, seminars, or other attempts to meet educational needs and objectives. House staff members, training directors, and hospital administrators are often unwilling to relinquish time on established ward or ambulatory rotations. Thus, more comprehensive residency training programs have been slow to develop, if at all. Clearly, the residents in internal medicine were only willing to recommend cuts in family planning, student health, or out-of-hospital rotations, areas that traditionally are not part of most internal medicine training programs.

As the data in Table 3 indicate, the physicians who completed internal medicine residencies in 1982 and the 1984 residents in the same program agreed that there was a need to increase input from subspecialists and attending physicians during residency training in ambulatory care. Increasing the input of attending physicians in the ambulatory setting was the most popular solution among the physicians for improving the educational component of the clinic experience during the residency. The recommendations made by the 1984 residents and the physicians regarding how to improve postgraduate training in internal medicine were almost identical with those reported in evaluation studies published over the past 25 years. Apparently, most training programs have not been successful in restructuring their curricula in order to meet the persistent and continuing needs of practicing physicians.

As noted in Table 4, the graduate physicians were highly satisfied with the educational climate of their practice in ambulatory care (mean = 3.57), but house staff members expressed significantly less satisfaction (mean = 2.78). This difference in the perceptions of the degree to which ambulatory care in the teaching hospital setting is intellectually stimulating or educationally valuable poses a major dilemma for medical educators. Attending physicians often see themselves as overworked and providing continual education in the ambulatory setting through a rapid series of one-to-one interactions with house staff members. On the other hand, house staff members vary widely in their use of attending physicians and tend to view the ambulatory experience as inefficient, with considerable time being spent waiting to see an attending physician, chasing down charts, or writing in them. Ways are needed to increase the amount of time house staff members can interact with attending physicians to promote their education.

It could be argued that the findings in this paper are not representative of the populations surveyed, since 34 percent of the graduate physicians did not respond to the questionnaire. However, since the graduates of 15 internal medicine residency programs were surveyed and many of the findings were consistent with previously published reports, the results should not be dismissed. Other possible questions that could be raised about the results are whether or not the perceptions of the graduate physicians are valid and whether program directors would agree with the graduates. Although there are no available data, the present authors have observed that program directors seem as prone as residents to want to add more to their curricula without being willing to cut things out. Apparently, outpatient dermatology and orthopedics, office management, and treatment of depression are not sufficient priorities in internal medicine training programs to justify reducing time spent by residents on inpatient wards, in intensive or critical care units, or in the emergency room. Yet, as the practice of internal medicine becomes less and less hospital-based and if program directors are going to try to meet the needs of practicing internists, dramatic changes in time allocation from inpatient to outpatient training must take place. Such changes have been undertaken modestly in general internal medicine training programs, and more dramatic changes have taken place in family medicine programs. However, program directors face several barriers in trying to alter their programs. First, serious hospital staffing problems are associated with shifting residents from inpatient to outpatient services. Second, directors may fear (justifiably or not) reducing the quality of the training experience, producing a less prepared internist, and subsequently developing the reputation of having a weak, less competitive training program. Third, serious problems are associated with asking already overextended but competent clinician-teachers to do more. Finally, some program directors have found it difficult to find competent teachers or to provide adequate training in many subspecialties.

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Students' Perceptions of Values Emphasized in Three Medical Schools

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Abstract—The purpose of the study presented here was to assess medical students' perceptions of the weight given to scientific and humanistic values in their learning environment and to determine whether students' perceptions in a given school vary according to their level of medical training and personal characteristics. The study was conducted in 1979 via a mail questionnaire sent to a sample of 713 freshmen, juniors, and graduates from three U.S. medical schools; 82.2 percent responded. The results indicated that the students' perceptions of school values varied little according to the students' personal characteristics, such as sociodemographic and educational background, interests before medical training, and expected specialty choice. However, important differences were observed in students' perceptions of values emphasized to them at different schools. Preclinical and clinical students' perceptions of the importance given to scientific values were similar. As for humanistic values, significantly lower ratings were given by clinical students than preclinical students in two of the schools.

One of the greatest challenges in medical education has been and will continue to be to achieve a proper balance among the attitudes, skills, and knowledge that medical students should possess to become good physicians.

Medical education over this century has shifted from a patient-oriented, empirical approach to a scientific approach which focuses on the biomedical aspects of the patient's disease. This change came about with the Flexner report in 1910 (1) and contributed to improvements in many areas of medical education and patient care. However, it had the unintended effect of progressively shifting the focus of medical education from a general concern for the patient to a more specific concern over the disease.

Studies on the development of professional attitudes in medical students attest to the displacement of student interest from the patient to the more specific biological and technological aspects of disease. As their medical training progresses, students have been reported to be more cynical (2–3), less concerned about the social and emotional needs of patients (4), and less interested in caring for chronically ill patients (5). Although medical education was not necessarily perceived

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as the only determinant of changes in student attitudes, medical educators saw in these findings a reason for concern. A number of medical schools added to the traditional curriculum specific educational programs designed to sensitize students to the importance of focusing care on the patient rather than on the disease. The idea was to make students aware of psychosocial factors as important variables in patient care and to stress the importance of establishing a good relationship and good communication with patients.

Evaluative studies of these programs, known as comprehensive care programs, revealed mixed results. On one hand, many programs sensitized students to the notion that therapeutic outcomes depend not only on the physician's bioclinical skills but also on the physician's ability to adapt, if necessary, the therapeutic approach to the particular human and psychosocial needs of patients (6–9). On the other hand, the positive effects of the programs on the students tended to be short-lived. Indeed, when students returned to their regular clinical medical training, mostly in hospital wards, their attitudes reverted to what they were before the program (7–8). In the programs examined in these studies, the values taught were generally not supported or reinforced by the rest of the medical environment. According to Rezler (10), in order to influence student attitudes toward patient care, medical values transmitted by the educational environment must be consistent and reinforced throughout the medical education process.

The purpose of the study reported here was to assess students' perceptions of the medical values emphasized in three differently oriented medical schools. More specifically, the study focused on two broad types of values which are not mutually exclusive: those oriented to the scientific aspects of disease and those oriented to the human aspects of patient care. The authors examined three questions:

1. Are students' perceptions of the values emphasized to them similar from one school to another?
2. Do preclinical and clinical students share the same perceptions of what is emphasized to them?
3. Do students' perceptions vary according to their personal characteristics?

Methods

Students' perceptions of the values emphasized in medical schools were measured in the course of a larger survey that was conducted in 1979 by the main investigator to determine the extent to which medical education influences students' attitudes (11). The survey was conducted on a sample of freshmen, juniors, and graduates from three midwestern U.S. medical schools. These schools were selected because they differed in their approach to medical education, as demonstrated by the structural characteristics and content of the preclinical and clinical curricula of each school at the time the survey was conducted (12).

The University of Michigan (UM) Medical School was chosen to represent the research-oriented medical school. It was established in 1850 and has a long tradition of biomedical research. The school is characterized by heavy specialization in all the various disciplines in medicine. At the time of the study, the school's admission policies placed strong emphasis on students' background in the natural sciences. No requirements were imposed in the social and behavioral sciences. In the preclinical years, students were required to take a series of courses in the basic and clinical sciences. Little instruction was given in the social and behavioral sciences. In the clinical years, students were required to take traditional clerkships in the major disciplines in medicine but none in family and community medicine. The school had an enrollment of about 950 students.

Wayne State University (WSU) School of Medicine, with its dual orientation in research and medical specialization on the one hand and primary care and community medicine on the other hand, was chosen to represent the middle stream of medical education in the United States. It was established in 1868 and is one of the largest medical schools in the United States, with an enrollment of more than 1,000 students. In its admission policies, the school stressed students' scientific preparation; the faculty recommended courses in psychology and social sciences, but none was required. In addition to the traditional clinical departments, the school had a department of community medicine and a department of family medicine. These departments were responsible for a series of courses that students must take during the first two years of the medical school curriculum. During the clinical years, a four-week clerkship was required in family medicine, in which students had an opportunity to work with family practitioners or other primary care physicians.

Michigan State University (MSU) College of Human Medicine was chosen to represent a new type of medical school, one oriented to the training of primary care physicians and characterized by an educative approach emphasizing the teaching of patient-centered care. The school was founded in 1968, is located in a rural area, and is the smallest of the three schools surveyed, with a total enrollment of approximately 450 students. Among the school's requirements for admission were nine undergraduate college credits in sociology and/or psychology, in addition to courses in the natural sciences and humanities. This psychosocial orientation was further reflected in the departmental structure of the school and in its curriculum. Along with the departments commonly found in medical schools, the MSU medical school had departments in sociology, psychology, anthropology, family medicine, community health sciences, and medical humanities. In the preclinical years, an important part of the curriculum was reserved for courses in the social and behavioral sciences. In the clinical years, students did their clerkships not in university or metropolitan hospitals but in the community hospital of one of five small or medium-sized cities. Students were generally assigned for the entire period of their clinical training to the same community hospital.

The survey was conducted in the winter semester of 1979 through the use of a self-administered mail questionnaire. Within each school, the questionnaire was sent to a sample of first-year students (freshman group), third-year students (junior group), and students who had completed their studies leading to the M.D. degree in the previous six months (graduate group). The students were chosen according to probability stratified sampling, using the students' school, academic class, sex, and race (white or nonwhite) as stratifying variables. This was done to ensure that the sample would include a sufficient number of female and nonwhite students and students from MSU medical school to permit reliable statistical analyses of these variables. Equal numbers were sought in each category of variables. Overall, 713 medical students were selected from a population of 1,774 individuals. Of this number, 29.5 percent were from UM medical school, 35.3 percent were from WSU medical school, and 35.2 percent were from MSU medical school. There were approximately equal numbers of freshmen, juniors, and graduates. Finally, 46.6 percent of the students were female, and 29.5 percent were nonwhite.

Of the 713 students selected, 586 returned their questionnaires, for an overall response rate of 82.2 percent. Of these, 567 provided complete data. There were no differences in the response rates among students of the three schools or between male and female students. However, a lower response rate was obtained for nonwhite students (68.4 percent) and for graduates, especially UM graduates (69.0 percent). Lack of time and motivation is perhaps the reason for a low response rate among graduates, who, in contrast to less advanced students, have to assume night studies regularly in addition to the day's work. The reason for race differences in the response rate could not be determined. Overall, the response rate within each sample cell was within the range of the rates usually documented for mail surveys.

The questionnaire was designed to measure the following variables: (*a*) sociodemographic characteristics (sex, age, race, religion, hometown size, presence of physician in the family, and parents' socioeconomics status); (*b*) premedical education and interests in the natural, social, and behavioral sciences; (*c*) attitudes toward professional issues (for example, physician's role in prevention) and sociopolitical issues (for example, national health insurance); (*d*) expected specialty choice; and (*e*) perception of values emphasized in the medical school. The last variable was the focus of the present paper.

The students' perceptions of values emphasized in the medical school environment were measured by a series of items that were inspired in some ways by the work of other researchers (13, 14) but that focused more specifically on values related to the school's scientific and humanistic orientation. In this paper, data are reported pertaining to students' perceptions of values emphasized overall in the medical school. The students were asked to indicate on a scale from 1 to 6 (where 1 means completely absent and 6 means strongly emphasized) how they would rate their medical school on six dimensions: (*a*) biomedical research, (*b*) rare diseases, (*c*) scientific approach, (*d*) "humanized" or patient-oriented patient care, (*e*) patient education, and (*f*) psychosocial orientation. The first three dimensions measured the school's scientific orientation, and the last three dimensions measured the school's humanistic orientation. When the questionnaire was shown to a sample of students prior to use with the sample reported here, the students had little difficulty understanding the dimensions given.

Analysis of variance was used to test for significant score differences among students of the three schools and among students at the three different levels of medical training. An analysis of covariance was performed to study the influence of the students' personal characteristics on their perceptions of what was emphasized in their medical school environment. The students' characteristics studied included a number of sociodemographic characteristics, premedical education and interests, expected specialty choice, and general political orientation. Prior to analysis, data were transformed into scores ranging from −3.0 to +3.0. As the sample was stratified, some groups of students (such as the female and nonwhite students) were over-represented. A weighting procedure, therefore, was used to make the overall sample representative of the student populations of the three schools.

Results

Table 1 presents the students' mean ratings, by medical school, of the importance given to scientific and humanistic values in the school learning environment. Results of these analyses indicated important differences in the students' perceptions of the emphasis given to scientific and humanistic values in their medical schools. All differences were significant at the .0001 level.

The UM medical students perceived their school as giving more importance to scientific values than to humanistic ones. In contrast, the medical students trained at MSU perceived their school as giving more importance to humanistic values than to scientific values. WSU medical students gave their school intermediate scores for the scientific and humanistic values.

Table 2 presents, by medical school and level of training, the students' mean ratings of the importance given to scientific values in their learning environment. Except for one instance (rare diseases at WSU medical school), the results of these analyses indicated that students at different levels of medical training did not differ significantly in their perceptions of the importance given to scientific values in medical education. In other words, the emphasis given in each school to biomedical research, rare diseases, and scientific values was perceived similarly whether the rating was done by preclinical or clinical students.

Table 3 shows the students' perceptions of their schools' humanistic values, with the results presented also by school and level of medical training. The results for the UM medical school and the WSU medical school revealed significant differences in the perceptions of preclinical and clinical students. Indeed, clinical students tended to perceive less emphasis on humanistic values than preclinical students. These differences in students' perceptions were observed for each of the three dimensions of humanistic values. There

TABLE 1

Mean Ratings of 567 Medical Students at Three Medical Schools of the Perceived Importance Given to Scientific and Humanistic Values by Their Schools, 1979*

Values	Students' Ratings†			*F* test
	School A (*n* = 164)	School B (*n* = 200)	School C (*n* = 203)	
Scientific values				
Biomedical research	.73	−.30	−.92	270.6‡
Rare diseases	.61	−.23	−.88	170.2‡
Scientific approach	.42	−.21	−.49	60.4‡
Humanistic values				
'Humanized' patient care	−.63	.09	1.02	224.4‡
Patient education	−.43	−.11	1.10	171.7‡
Psychosocial orientation	−.42	−.07	1.03	144.6‡

* School A = University of Michigan Medical School, Ann Arbor, Michigan; School B = Wayne State University School of Medicine, Detroit, Michigan; School C = Michigan State University College of Human Medicine, East Lansing, Michigan.

† Expressed as standardized scores ranging from −3.0 to +3.0.

‡ $P < .0001$.

TABLE 2

Mean Ratings of 567 Students at Three Medical Schools of the Perceived Importance Given to Selected Scientific Values by Their Schools, by School and Students' Level of Training, 1979*

Scientific Values	Students' Ratings†			*F* test
	Freshmen	Juniors	Graduates	
Biomedical research				
School A	.68	.73	.77	0.28
School B	−.37	−.23	−.31	0.79
School C	−.84	−.96	−.97	0.72
Rare diseases				
School A	.55	.67	.60	0.46
School B	−.54	.03	−.21	11.27‡
School C	−.84	−.89	−.92	0.19
Scientific approach				
School A	.38	.44	.45	0.17
School B	−.21	−.18	−.25	0.17
School C	−.31	−.60	−.62	2.24

* School A = University of Michigan Medical School, Ann Arbor, Michigan; School B = Wayne State University School of Medicine, Detroit, Michigan; School C = Michigan State University College of Human Medicine, East Lansing, Michigan.

† Expressed as standardized scores ranging from −3.0 to +3.0.

‡ $p < .001$.

TABLE 3

Mean Ratings of 567 Students at Three Medical Schools of the Perceived Importance Given to Selected Humanistic Values by Their Schools, by School and Students' Level of Training, 1979*

Humanistic Values	Students' Ratings†			*F* test
	Freshmen	Juniors	Graduates	
'Humanized' patient care				
School A	−.31	−.81	−.76	8.18‡
School B	.37	.15	−.28	17.59‡
School C	.99	1.01	1.06	0.69
Patient education				
School A	1.14	−.59	−.57	6.48§
School B	.05	.01	−.37	6.46§
School C	1.19	1.01	1.07	0.10
Psychosocial orientation				
School A	.05	−.75	−.58	17.27‡
School B	.20	−.15	−.26	7.43‡
School C	1.05	.98	1.07	0.60

* School A = University of Michigan Medical School, Ann Arbor, Michigan; School B = Wayne State University School of Medicine, Detroit, Michigan; School C = Michigan State University College of Human Medicine, East Lansing, Michigan.

† Expressed as standardized scores ranging from −3.0 to +3.0.

‡ $p < .001$.

§ $p < .005$.

were no such differences at MSU, where perceptions of the importance attached to humanistic values were similar whether the rating was done by preclinical or clinical students.

Finally, the extent to which the students' personal characteristics influenced their perceptions of what was emphasized in medical school was studied. The results of these analyses indicated that the student's medical school and level of training accounted for approximately 40 to 50 percent of the variance in the student's perceptions of school values (one exception being "scientific approach," where less variance was accounted for), whereas students' personal characteristics explained very little additional variance. In other words, perception of school values was not influenced by the personal characteristics of the student doing the rating.

Discussion

Very few people will contend that medicine is not both an art and a science. Yet medical educators will attest that to achieve the proper balance between these two components is difficult.

In the study described here, the authors assessed students' perceptions of the emphasis given to scientific and humanistic values in their learning environment. The results indicate there is a wide school variation in the weight attached to these values in medical education. Therefore, although theoretically both the scientific aspects of disease and the humanistic aspects of patient care are equally valued, the expression of these values in the medical school learning environment varies considerably from one school to another.

In two of the three schools surveyed, the results also point to a weakening of the humanistic values during the crucial clinical years, when professional values are being shaped and internalized. Similar results were obtained on other items in the comprehensive survey conducted in 1979 by the authors. These items measured the students' perceptions of the values of medical faculty members with regard to the human, social, and educative aspects of patient care, and were reported by the authors at the 1985 Annual Conference on Research in Medical Education. However, clinical students gave significantly lower ratings to their faculty instructors than did preclinical students, not only at the UM and WSU but also at MSU. This suggests that the values put forward by the school can sometimes be different from the values put forward by clinical teachers.

The study indicates that students' perceptions of values emphasized in the medical school environment varied little according to the personal characteristics of the students. Whatever their sociodemographic characteristics, premedical education and interests, expected specialty choice, and political orientation, medical students from the same schools and levels of training perceived school values in very similar ways. These results contribute to the stability and validity of students' perceptions in assessing the medical school environment.

Changes may have occurred since the study was conducted in 1979. Recent data on medical education in the United States and Canada reveal a concern on the part of medical educators with achieving a better equilibrium between the biomedical aspects of disease and the human, social, educative, and ethical aspects of patient care (15). For instance, medical schools have, to varying degrees, modified their curricula for the preclinical years by introducing courses in the social and behavioral sciences and by using a problem-oriented approach to medical education in order to enhance students' perceptions of care that is patient-oriented rather than disease-oriented. In the clinical years at some schools, besides the traditional clerkships in medicine, surgery, pediatrics, obstetrics/gynecology, and psychiatry, students are now required to take clerkships in family medicine (56 schools), community medicine (20 schools), and/or primary care (21 schools) (16).

However, national data on the 1983 graduates of U.S. medical schools indicate that efforts made by medical schools in this regard are still insufficient (16). Between 35 and 60 percent of the 1983 graduates believed there was not enough time set aside in the curriculum for the management of patients' socioeconomic, educational, and emotional problems, patient follow-up, care of ambulatory patients, care of the elderly, preventive care, and community medicine (16).

Studying the values emphasized in medical schools can be helpful in many ways. It can give faculty members important information about how students see the school. It can provide a tool to assess curricular and organizational change. It can also assist potential students in medical school selection. As for the relationship between the students' perceptions of their learning environment and what they learn, this has not been empirically tested in medical education. However, Haertel and colleagues (17) have documented the existence of such a relationship at the elementary and high school levels.

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DATAGRAM

Residency and Career Plans and Indebtedness Of 1985 Medical School Graduates

Each year the Association of American Medical Colleges surveys senior medical students regarding their medical school experiences and career plans. The data reported here were obtained from 11,048 final-year students, about 66 percent of the 1985 graduating class. (Tables accompanying this datagram appear on the following three pages.)

Residency Plans

About 96 percent of the students responding to the survey planned at least one year of residency. Thirty-six percent of those planning a residency expected it to be three years in length; another 49 percent expected to spend four or five years in their residencies.

Internal medicine and family practice were the most frequently chosen areas for both the residency and the specialty in which certification would be sought. These two areas have been students' first choices for the past several years. Table 1 shows specialty certification plans by residency program choices for all respondents who indicated specialty and residency preferences. Seventy-four percent of the respondents indicated that they had decided on a specialty. This figure has remained relatively stable in recent years.

Postresidency Career Plans

Clinical practice was the first choice of career activity of 70 percent of the students responding to the survey, with 58 percent choosing private clinical practice and 12 percent salaried clinical practice. Twenty-eight percent planned full-time academic careers, and less than 1 percent planned careers in administration or as salaried research scientists. Table 2 shows the students' first choices of career plans by their preferred specialties.

The practice setting most preferred by 1985 graduates was a medium-size city (population 50,000 to 500,000), chosen by 29 percent of the respondents. Rural areas were the least preferred settings, selected by less than 1 percent of the respondents. Sixteen percent indicated that they plan to locate in socioeconomically deprived areas. Table 3 shows the students' first choices of practice settings by their preferred specialties.

Indebtedness

Eighty-five percent of the 1985 respondents had some educational debt upon graduation from medical school. The 1984 figure was 88 percent. The mean amount of indebtedness for those reporting debt was $29,942, up from $26,496 for the class of 1984. This represents a 13 percent increase.

Thomas H. Dial, *staff associate, Division of Operational Studies, Association of American Medical Colleges, Washington, D.C.*

TABLE 1

Percentage of Responding 1985 Medical School Graduates Indicating a Preference for Each of 21 Specialty Categories, by Preferred Residency Program*

Specialty	Residency Program											Overall Row Percentage
	Anesthesiology	Emergency Medicine	Family Practice	Internal Medicine	Obstetrics/ Gynecology	Orthopedics Surgery	Pediatrics	Psychiatry	Radiology	General Surgery	Other	
Anesthesiology	98.2	.9	.2	.8	.0	.0	.4	.0	.0	.6	.1	4.1
Dermatology	.0	.0	.2	2.5	.0	.0	.7	.0	.0	.0	4.9	1.2
Emergency medicine	.0	95.3	.2	.6	.0	.0	.0	.0	.0	.2	.0	2.6
Family practice	.0	2.8	98.7	.0	.0	.0	.0	.0	.0	.0	.1	14.6
General internal medicine	.3	.9	.1	43.6	.0	.0	.0	.0	.0	.0	.4	11.8
Internal medicine subspecialties	.0	.0	.2	44.0	.2	.2	.6	.2	.0	.2	.2	11.9
Neurology	.0	.0	.0	1.7	.0	.0	2.3	.0	.0	.0	10.6	1.7
General obstetrics/ gynecology	.0	.0	.1	.1	76.6	.0	.0	.0	.0	.0	.0	5.9
Obstetrics/gynecology subspecialties	.0	.0	.0	.0	23.1	.0	.1	.0	.0	.1	.1	1.8
Ophthalmology	.0	.0	.1	1.9	.0	.2	.5	.0	.0	.4	11.2	1.7
Pathology	.0	.0	.1	.2	.0	.0	.1	.0	.0	.0	18.0	1.8
General pediatrics	.0	.0	.0	.1	.0	.0	67.1	.0	.0	.0	.0	6.4
Pediatrics subspecialties	.0	.0	.0	.4	.0	.0	25.8	.0	.0	.1	.0	2.6
Psychiatry	.0	.0	.1	.6	.0	.0	.2	99.3	.0	.0	.1	5.3
Radiology	.0	.0	.1	1.7	.0	.0	.5	.2	100.0	.4	.2	4.1
General surgery	.0	.0	.0	.1	.0	.0	.0	.0	.0	58.5	.4	7.0
Orthopedic surgery	.0	.0	.0	.0	.0	99.3	.0	.0	.0	4.2	.1	5.8
Other surgery	.0	.0	.0	.1	.2	.2	.0	.0	.0	28.8	8.4	4.2
Otolaryngology	.0	.0	.0	.0	.0	.0	.0	.0	.0	3.7	17.8	2.1
Urology	.3	.0	.0	.0	.0	.0	.0	.0	.0	2.5	18.7	2.1
Other	1.2	.0	.2	1.5	.0	.0	1.6	.2	.0	.3	8.4	1.5
Overall column percentage	3.8	2.5	14.7	26.8	7.7	5.3	9.5	5.1	3.5	11.8	9.4	100.0

* Percentages in the body of the table are based on the numer of students indicating a preference for the particular residency program and specialty. Columns total 100 percent. Overall column percentages and overall row percentages are based on total number of responding students (8,612). Percentages may not add to 100 because of rounding.

TABLE 2

Percentage of Responding 1985 Medical School Graduates Indicating a Preference for Each of 10 Career Categories, by Preferred Specialty*

Specialty	Career Category: Teaching		Career Category: Private Clinical Practice				Career Category: Salaried Clinical Practice			Other	Overall Row Percentage
	Basic Science	Clinical Science	Alone	With One Other	Group 3 or More	Undecided Number	Hospital	Group Clinic	State-Federal Agency		
Anesthesiology	1.0	24.1	1.0	3.4	49.0	7.0	9.7	.9	2.4	1.5	5.7
Dermatology	1.2	28.7	11.4	19.8	19.2	12.6	2.4	3.0	1.8	.0	1.6
Emergency medicine	.3	18.0	.7	1.0	24.6	3.8	43.3	2.8	2.4	3.1	2.8
Family practice	.0	2.4	5.6	18.6	49.4	12.2	1.2	3.7	4.4	2.5	13.4
General internal medicine	.5	21.6	2.7	7.7	38.3	12.7	3.9	7.5	3.3	1.8	10.7
Internal medicine subspecialties	1.2	49.8	1.0	6.3	23.7	9.6	4.7	.8	1.6	1.2	10.6
Neurology	4.1	56.6	2.6	4.1	16.3	7.7	3.6	1.5	1.5	2.0	1.9
General obstetrics/gynecology	.0	12.0	2.2	9.7	58.1	6.4	2.6	4.6	3.5	1.1	5.4
Obstetrics/gynecology subspecialties	.0	51.9	.6	5.6	28.1	5.0	5.0	1.3	1.3	1.3	1.6
Ophthalmology	.6	22.9	9.4	18.5	28.1	15.2	1.1	.6	2.5	1.4	3.6
Pathology	29.6	15.1	1.1	.6	15.1	5.0	27.9	.0	2.8	2.8	1.8
General pediatrics	.5	21.5	2.0	7.1	42.1	10.3	4.6	6.1	3.7	2.0	5.8
Pediatrics subspecialties	1.7	61.4	.9	1.7	14.6	2.6	12.4	.4	1.3	3.0	2.3
Psychiatry	1.7	32.2	10.0	7.5	15.6	16.0	6.4	2.8	4.9	2.8	5.2
Radiology	1.0	27.2	.9	2.9	42.0	5.5	16.1	1.4	1.9	1.2	5.7
General surgery	.8	31.7	4.0	12.4	29.5	11.3	3.2	.5	4.9	1.9	6.2
Orthopedic surgery	.3	24.3	3.1	9.1	44.4	11.4	1.7	.5	4.3	.9	5.7
Other surgery	.3	50.8	3.8	8.9	23.4	6.6	2.8	.0	1.3	2.3	3.9
Otolaryngology	.4	38.0	3.3	11.6	27.3	11.6	.8	.8	5.4	.8	2.4
Urology	.0	29.5	1.5	20.0	30.5	12.5	2.0	1.0	2.5	.5	2.0
Other	.5	29.3	2.2	7.6	24.5	13.0	15.2	1.1	3.8	2.7	1.8
Overall column percentage	1.2	27.1	3.4	9.3	35.1	10.1	6.3	2.6	3.2	1.8	100.0

* Percentages in the body of the table are based on the number of students indicating a preference for the particular career category and specialty. Rows total 100 percent. Overall column percentages and overall row percentages are based on total number of responding students (10,194). Percentages may not add to 100 because of rounding.

TABLE 3

Percentage of Responding 1985 Medical School Graduates Indicating a Preference for Each of Nine Practice Setting Categories, by Preferred Specialty*

Specialty	Practice Setting Category†									Overall Row Percentage
	Large City	Suburb Large City	Midsize City	Suburb Mid City	Small City	Town	Small Town	Rural	Undecided or No Preference	
Anesthesiology	24.4	14.0	38.7	7.7	7.7	1.4	.2	.2	6.0	5.8
Dermatology	26.8	19.6	23.2	11.3	10.7	.6	.0	.6	7.1	1.6
Emergency medicine	19.9	13.0	35.3	8.9	11.0	2.4	.3	1.0	8.2	2.9
Family practice	3.5	5.4	10.6	9.8	31.4	22.8	6.8	3.4	6.3	13.4
General internal medicine	19.3	12.3	30.2	6.8	15.0	5.4	.5	1.0	9.4	10.8
Internal medicine subspecialties	33.1	15.4	30.9	5.2	5.4	.9	.0	.2	8.9	10.6
Neurology	37.1	14.2	36.0	4.1	3.0	.5	.0	.0	5.1	1.9
General obstetrics/gynecology	19.7	15.5	34.2	8.4	12.6	2.4	.0	.5	6.6	5.4
Obstetrics/gynecology subspecialties	35.4	18.6	30.4	5.0	4.3	.6	.0	.0	5.6	1.6
Ophthalmology	21.7	21.4	30.5	13.2	9.1	.5	.0	.0	3.6	3.6
Pathology	33.1	9.6	35.4	4.5	9.0	1.7	.6	.0	6.2	1.7
General pediatrics	16.6	14.9	28.1	7.6	12.5	5.8	.8	.5	13.2	5.8
Pediatrics subspecialties	35.6	11.6	36.5	3.4	5.6	1.3	.0	.4	5.6	2.3
Psychiatry	31.8	14.9	30.2	5.3	9.6	1.7	.0	.0	6.4	5.2
Radiology	26.9	20.8	31.5	9.0	7.1	.7	.0	.2	4.0	5.7
General surgery	23.2	10.2	31.2	6.7	15.4	4.0	.5	.5	8.4	6.2
Orthopedic surgery	17.2	19.5	32.9	11.2	11.6	.9	.2	.2	6.4	5.7
Other surgery	38.8	16.1	29.3	5.1	3.6	.5	.0	.0	6.6	3.8
Otolaryngology	20.3	20.3	39.4	7.1	7.1	.0	.0	.4	5.4	2.4
Urology	20.0	18.0	39.0	8.5	9.0	.5	.0	.0	5.0	2.0
Other	20.3	15.4	40.7	7.7	7.1	.0	.5	.0	8.2	1.8
Overall column percentage	22.3	14.1	29.5	7.7	12.6	4.9	1.1	.8	7.2	100.0

* Percentages in the body of the table are based on the number of students indicating a preference for the particular practice setting category and specialty. Rows total 100 percent. Overall column percentages and overall row percentages are based on total number of responding students (10,188). Percentages may not add to 100 because of rounding.

† Large city = 500,000 or more; midsize city = 50,000–500,000; small city = 10,000–50,000; town = 2,500–10,000; small town = less than 2,500.

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Private Physicians in Ambulatory Care Training In U.S. Medical Schools

John C. Meadows, Jr., M.D., Richard L. Bauer, M.D., and Andrew K. Diehl, M.D.

Abstract—The contribution of private physicians to medical student education in ambulatory care was determined by a questionnaire directed to departments of family practice, internal medicine, and pediatrics in 124 U.S. medical schools and their branch campuses. The response rate was 84 percent. Of the responding departments, 82 percent offered an ambulatory care course in curricular years three and/or four, and 56 percent utilized private physicians in their courses. Departments of internal medicine were least likely to offer such a course, and their courses less frequently included teaching by private physicians ($p < 0.0001$). When offered, internal medicine courses in ambulatory care were least likely to be required for graduation and involved the fewest students. Departments of family practice were most likely to offer ambulatory care courses and were most likely to utilize private physicians in their courses.

Although community-based private physicians frequently teach in U.S. medical schools, their contribution to medical education has not been fully described. A variety of ambulatory care courses using such physicians has been reported (1–7). The reasons for recruiting private physicians to teach ambulatory care and the degree of their involvement vary considerably, as do the format, duration, and timing of ambulatory care courses. Some institutions have reported using private physicians because of the need for more teaching space and additional faculty members (3, 7) and for exposing students to a wider variety of patients (1–7). In others, courses include private physicians as teachers to encourage students to choose a certain specialty or practice site (3, 8).

At the University of Texas Medical School at San Antonio, community-based physicians are used extensively as teachers in a six-week ambulatory medicine course required of fourth-year medical students. The departments of medicine, pediatrics, and family practice offer students full- or part-time experiences with community-based physicians during the course. To compare the course with similar courses at other institutions, the authors surveyed the primary care departments of all medical schools in the United States. The purpose was to define the extent to which private practitioners taught ambulatory care and to ascertain the goals of the courses in which they taught.

Dr. Meadows is clinical professor of medicine, Dr. Bauer is assistant professor of medicine, and Dr. Diehl is associate professor of medicine and chief of the Division of General Medicine, all in the Department of Medicine, University of Texas Medical School at San Antonio, Texas.

Methods

From May through August 1984 a questionnaire was mailed to all family practice (or equivalent), internal medicine, and pediatrics departments in the 124 U.S. medical schools listed as institutional members in the *AAMC Directory of American Medical Education, 1983–1984* (9). Branch campuses of the medical schools of the universities of Illinois, Kansas, Oklahoma, and West Virginia also were mailed questionnaires and treated as separate institutions in the analysis. Department chairmen or their representatives were questioned regarding courses for medical students in ambulatory care and the participation of private physicians in these courses. Requested information included the format and goals of the course, the reasons for using private physicians, financial compensation offered to students and faculty members, and an assessment of the course's educational value. In November 1984 one follow-up letter was sent to each department that had not responded to the initial mailing.

Several departments reported having more than one ambulatory care course. In such cases, data from all such courses offered by the department were used to compute the average duration, percentage of time spent in various course components, and student financial support for the department's ambulatory care program. This average was weighted according to the proportion of the students in the school's 1983–84 class who were in each individual course. The sizes of the 1984 graduating classes of the responding schools were obtained from published reports (10).

Questionnaires were mailed to the departments at the 124 medical schools and their branch campuses. Four schools, in addition to the main campus, had a total of six branch campuses making a total of 130 institutions. All the institutions had departments of internal medicine and pediatrics. Twenty-five institutions listed no department of family practice in the *AAMC Directory of American Medical Education, 1983–84* (9), but four chairmen of family practice and five chairmen of community medicine departments responded to letters addressed to departments of family practice in these schools. The remaining 16 institutions were assumed to have no departments of family practice. One two-year school was excluded from analysis. Responses from the remaining departments (129 internal medicine, 129 pediatrics, and 113 family practice departments) formed the basis of the analysis, in which the authors examined only those courses offered during the third and fourth academic years. (Thirteen departments also offered ambulatory care courses in the first or second year of medical school.)

Statistical tests to compare ambulatory care courses in various departments were performed using the Statistical Package for the Social Sciences (11). Two-tailed tests of significance were used in all analyses. Student's *t*-tests were used to test differences in continuous variables such as course duration, and chi-square tests were used for tabular data such as interdepartmental differences in course assessments.

Results

Responses were received from 312 of the 371 departments polled, for a response rate of 84.1 percent. The rate was comparable among departments of family practice (80 percent), internal medicine (85 percent), and pediatrics (87 percent). Departments in private schools responded nearly as often (80 percent of 130) as did those in public schools (86 percent of 241).

Overall, 255 (82 percent) of the responding departments offered an ambulatory care course in curricular years three and/or four, and 175 (56 percent) of all of the responding departments included private physicians in such courses. Internal medicine departments offered ambulatory care courses less frequently (64 percent) than did family practice (89 percent) or pediatrics departments (94 percent) ($p < .001$) (Figure 1). Furthermore, internal medicine courses in ambulatory care were far less likely to include teaching by private physicians (internal medicine, 26 percent; family practice, 80 percent; pediatrics, 66 percent) ($p < .001$). Internal medicine courses in ambulatory care that included private physicians were less likely to be required for graduation (internal medicine, 48 percent; family practice, 74 percent; pediatrics, 66 percent; $p = .03$) and involved fewer students (mean = 52 students for internal medicine versus 88 and 84 students for family practice and pediatrics, respectively; $p = .03$). Of the 312 responding departments, 49 offered one or more full-time preceptorship courses, which were defined as courses with 90 percent or more of the course time spent under the direction of private physicians. Internal medicine and pediatrics departments were less likely to offer full-time preceptorships (family practice, 33 percent of 90 departments; pediatrics, 8 percent of 112; internal medicine, 9 percent of 110; $p < .001$).

Because the definition of private physician may vary among schools, the departments were asked to identify any use of private physicians in their ambulatory care courses. The responses indicated that most private physicians described in this study were volunteers with active practices based outside the university. Specifically, 91 percent of the programs utilized private physicians whose offices were located in the community. The remaining

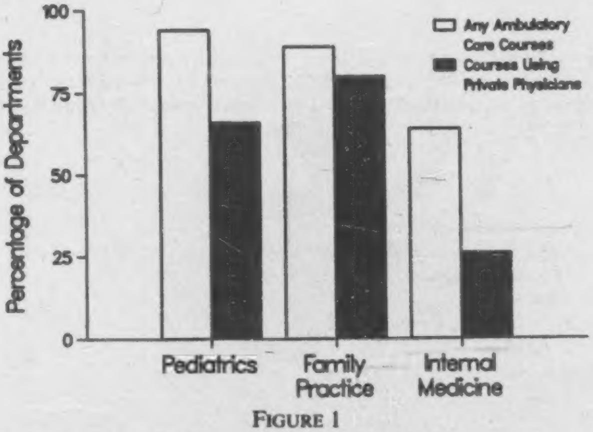

FIGURE 1

Percentages of 90 family practice, 112 pediatrics, and 110 internal medicine departments that offered a course in ambulatory care and percentages that used private physicians in such courses in U.S. medical schools, 1983–84.

departments, most of which were located in private institutions, stated that their private physicians had offices and taught in university facilities. To differentiate these two groups, the first is described in Table 1 as community-based private physicians, and the second is termed university-based private physicians. Only 21.4 percent of the departments offered any remuneration to the private physician for teaching services. The mean annual stipend of $81 to these physicians also supported the conclusion that most of their services were voluntary.

The proportion of students who were exposed to private practice was determined by comparing the number of students taking ambulatory care courses involving private practitioners in the responding departments during 1983–84 with the total number of students graduating from the schools of the responding departments in 1984. Departments of internal medicine provided exposure to private practice to a smaller percentage of students than did the departments of family practice and pediatrics (Figure 2).

The departments were polled regarding the format of their courses that involved private physicians. The mean duration for these courses was 5.0 weeks, which did not differ significantly among the three disciplines. The proportion of time spent by the students in various activities was similar for the departments of family practice and internal medicine (Table 1). Family practice students spent more time with community physicians and less time in hospital clinics than did internal medicine students. Students in pediatrics courses spent far less time with community-based physicians and far more time in university outpatient clinics than did students in the other departments. In addition, courses offered by pediatrics departments often included an inpatient component. The remainder of course time was spent in a variety of activities, including nonuniversity hospital clinics, seminars, lectures, and independent study.

The rationale for involving private physicians in teaching ambulatory care was also surveyed. The responding course di-

TABLE 1

Mean Percentages of Course Time Spent in Different Components of Ambulatory Care Courses Involving Private Physicians Conducted by 61 Departments of Family Practice, 25 Departments of Internal Medicine, and 68 Departments of Pediatrics, U.S. Medical Schools, 1983–1984

Course Component	Departments		
	Family Practice	Internal Medicine	Pediatrics
Under direction of private physicians			
Community-based physicians*	62.0	56.5	29.7
University-based physicians†	18.9	15.4	10.5
In hospital clinics			
University	7.2	19.8	42.1
Nonuniversity	2.0	2.7	3.0
In independent study	1.3	2.7	2.2
Other	8.6	2.9	12.5
Total	100.0	100.0	100.0

* Community-based physicians are physicians who have their offices and teach outside the university.

† University-based physicians are physicians who have their offices and teach in university facilities.

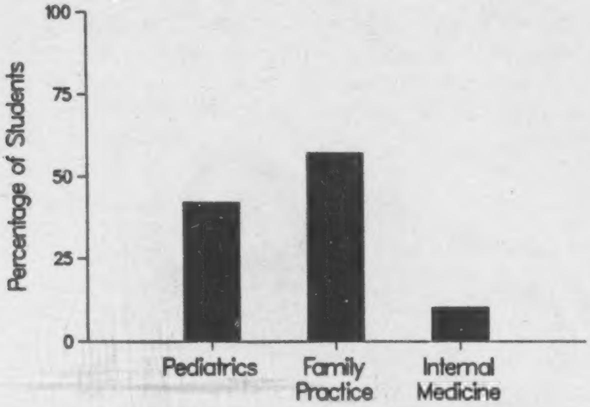

FIGURE 2

Percentages of students graduating in 1984 at the U.S. medical schools of the responding departments of family practice (90), pediatrics (112), and internal medicine (110) who were exposed to private practice in ambulatory care programs conducted by the departments during 1983–84 (total graduating students were 11,201 at the schools of the family practice departments, 14,493 at the schools of the pediatrics departments, and 14,140 at the schools of the internal medicine departments).

TABLE 2

Numbers and Percentages of 61 Family Practice, 25 Internal Medicine, and 68 Pediatrics Departments in U.S. Medical Schools Identifying Reasons for Using Private Physicians in Their Ambulatory Care Courses, 1983–84

Course Objectives	Family Practice Departments		Medicine Departments		Pediatrics Departments	
	No.	Percentage	No.	Percentage	No.	Percentage
Teach attitudes in patient care	30	49	13	52	38	56
Improve students' clinical skills	26	43	9	36	21	31
Furnish cognitive knowledge to students	5	8	2	8	6	9
Demonstrate other career choices	13	21	6	24	14	21
Encourage private practice as a career	10	16	1	4	1	1

rectors most frequently cited "to teach attitudes in patient care" and "to improve clinical skills" as reasons for using private physicians as instructors (Table 2). Although all three specialties were equally interested in "demonstrating other career choices," only the departments of family practice seemed inclined to "encourage private practice as a career."

Financial support to students enrolled in ambulatory care courses using private physicians was most commonly provided by departments of family practice (32 percent versus 8 percent for internal medicine and 6 percent for pediatrics; $p = .0001$). Directors of family practice courses were more likely to describe the "quality" of their courses as "exceptional" than were those of internal medicine or pediatrics (54 percent versus 16 percent and 25 percent, respectively; $p < .01$). Similarly, as reported by the course directors, students enrolled in family practice courses were most apt to rate course quality as "exceptional" (69 percent versus 46 for pediatrics and 16 percent for internal medicine; $p = .0005$).

Discussion

Patient care was the primary activity of 81 percent of U.S. physicians in 1983 (12). To improve student education in primary care, Eichna (13) has advocated required ambulatory medicine courses in the fourth year of medical school. He stated that medical education "has an obligation to society to produce not only good doctors but also the proper distribution of doctors among types of practice." Although surveys show a wide disparity between diagnoses made in tertiary care systems and those made in private offices (4, 7, 8, 14), many students are taught primary care only in university settings. Fletcher and colleagues (15) stated, "Doctors in training should not be misled into believing that the medical aspects of clinic experiences are similar to primary care in office practice."

The study reported here demonstrates that most family practice, internal medicine, and pediatrics departments offer ambulatory care courses and that 56 percent offer experience in private practice settings. Family practice faculties have long held that formal courses in primary care produce better educated students and also attract students to that field (3, 8). Their assertion is reflected in the present study in the high percentage of family practice departments offering ambulatory care courses and the frequent inclusion of private practitioners in teaching these courses. In contrast, internal medicine departments offered ambulatory care courses less often than other departments and were less likely to involve private physicians. Their courses were less often required for graduation and had relatively small numbers of students. Further, relatively few full-time preceptorships were offered by internal medicine. Directors of internal medicine courses were the least likely to rate their courses as "exceptional" and to estimate that students would view their courses as "exceptional."

Private physicians are a major potential resource for instruction in ambulatory care. Although there may be limitations to their contribution, as student involvement and responsibility for patient care may be less intensive in private offices than in university settings, the inclusion of private physicians can enhance the teaching of attitudes and can broaden the educational experience of the student (1–8, 13–15). Unfortunately, internal medicine departments have underused this resource in comparison with departments of family practice and pediatrics.

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Location of Medical Education And Choice of Location of Practice

W. Bradley Burfield, Douglas E. Hough, Ph.D., and William D. Marder

Abstract—The geographical distribution of physicians is affected by a number of factors, including the location of their medical education. The authors of the present paper examined the physicians' decisions on where to locate after they completed their training by determining where a state's practicing physicians come from and whether physicians who are trained in a state practice in that state or out of state. The results indicated a positive correlation between location of training and location of practice. Women physicians and general/family practitioners were most likely to remain in the state where they received their graduate medical education. The results also suggested that medical schools and graduate medical education programs are vehicles through which a state can attract physicians who will practice there.

The geographic distribution of physicians is affected by a number of factors, one of which is the location of their medical education programs. In fact, one of the missions often set for a state's medical education system is to provide an adequate number of practicing physicians in the state. A medical school can be an effective vehicle for accomplishing this mission because of the school's influence on the choices of location made by its own graduates and because of the influx of physicians trained out of state who are attracted to the state by the medical school facilities. A state also can seek to increase the number of residency positions in institutions in the state in order to take advantage of the finding that residents are more likely than medical students to remain in the state where they received their training (1–5).

A state might consider other strategies to attract practicing physicians. For example, it could modify its schools' missions in order to attract the types of students who would tend to remain in the state, as did the "community-based" medical schools created in the 1960s and 1970s (6–10). Alternatively, a school could forgive or reduce the repayment of student loans if a student practiced in the state (or, especially, an underserved area of the state) after graduation. Kansas and Ohio are two states that established such programs. More dramatically, a state could opt not to have a public medical school, choosing instead to finance the state's students at out-of-state medical

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schools. Finally, a state can employ a "beggar-thy-neighbor" policy, relying on other states to train physicians and then giving financial incentives to induce those physicians to relocate.

Before a state government can choose the most effective policy, it must have detailed information on the locational decisions of physicians after they complete their training. In this paper, the authors supply some of that information. They addressed two related but not identical questions: Where do a state's practicing physicians come from? Do the physicians who are trained in a state practice in state or out of state? The results provide two perspectives on the relation between location of training and location of practice in physicians' career decisions.

Methods

The information on physician location and other characteristics for the study came from the American Medical Association Physician Masterfile, compiled and maintained since 1906. The masterfile contains demographic and professional information on all active physicians and residents in the United States. Information on physicians is updated daily from a variety of sources. In addition, a full census is conducted every four years through a mail survey, the Physicians' Professional Activity Census. More complete information on the masterfile and its accuracy is available elsewhere (11, 12).

The authors of the present paper used data from the masterfile as of December 31, 1982, the most recent fully documented file. At that time, 449,389 physicians were involved in patient care or in other professional activities, including medical teaching and research. This figure excluded physicians whose activities were unclassified (13,558), whose addresses were unknown (3,321), and who were inactive (35,690). Residents in training at the end of 1982 (68,986, including foreign medical graduates [FMGs]) were ineligible for the study as they had not determined a practice location. The other FMGs (82,739) were excluded and studied separately because this study focused primarily on graduates of U.S. medical schools. Finally, the study group did not include the 3,014 physicians for whom the masterfile either reported no residency information or contained records of more than six residencies, since the determination of a state in which physicians received a plurality of their graduate medical education becomes less meaningful for physicians with seven or more residencies. The final total number of physicians in the study was 294,650.

The authors conducted the separate analysis of foreign medical graduates (FMGs) in order to compare their choices of practice location with those of U.S. medical school graduates. As of December 31, 1982, a total of 87,524 FMGs were involved in patient care and 8,103 in other professional activities. Of this total, 12,888 residents who were FMGs were excluded from the study. Of the resulting 82,739, the masterfile contained complete records on 76,883, the number used in the study reported here.

In this study, the authors considered the state where a student obtained his medical degree to be the state of his medical school regardless of the number of schools the student attended. The state of medical residency was considered to be the state where a physician received a plurality (that is, the largest proportion) of graduate medical education. This method avoided counting physicians as having trained in-state when they obtained only brief postdoctural fellowships or residencies in the state after having practiced for some years. Finally, the state of practice was considered to be the state where a physician was practicing at the end of 1982.

Results

Table 1 shows the number and percentage of active, U.S.-trained physicians in 1982 who were practicing in the state where they received their training. Of the 294,650 practicing physicians who had graduated from a U.S. medical school, 115,737 (39.3 percent) were practicing in the same state as their medical school, 150,509 (51.1 percent) were practicing in the state where they had received their graduate training, and 87,430 (29.7 percent) were practicing in the same state where they had obtained both their undergraduate and graduate medical education. In Table 1 the row percentages do not add to 100 percent because the categories were neither mutually exclusive nor exhaustive. For example, a physician with no medical education history in the state where he practiced was not included in any of the categories. Further, a physician practicing in the state where he completed both his medical school and residency training appeared in all categories.

These overall numbers mask variations in terms of the physicians' characteristics, as shown in Table 1. Although the percentages of male and female physicians who graduated from a medical school in their state of practice were almost identical, considerable differences appear with regard to state of graduate medical education. On average, 60 percent of a state's female physicians completed a plurality of their residency training there, compared with only half of the state's male physicians. Approximately one-third of the female physicians received both undergraduate and graduate training in their state of practice.

Some variations occurred by age as well. Older physicians (and, to some extent, the youngest physicians) were more likely than other age groups to have been trained in the state where they practiced. Physicians who had graduated from medical school only 11 to 20 years earlier were most likely to have received their medical education outside their state of practice.

Segmenting the physician population by practice specialty revealed other patterns. General or family practitioners were by far the most likely to practice in the state where they earned their medical degree; they were also the second most likely, after psychiatrists, to have completed their residency in the state of practice. "Other" specialists (primarily pathologists) showed the lowest propensity for practicing in the state where they obtained their medical education. Finally, psychiatrists were among the least likely to practice in the state where they attended medical school while the most likely to practice where they received most of their residency training.

The characteristics of a physician's medical school seemed to influence subsequent choice of practice location, as shown in Table 1. Forty-eight percent of the practicing physicians who attended a U.S. public medical school did so in the state where they practiced. By contrast, only 31 percent of the physicians who attended a private medical school in the United States did so in the state where they practiced. This difference probably can be attributed more to the strong preferences that public medical schools give to applicants from their state than to ex-

TABLE 1

Numbers and Percentages of U.S.-Trained Physicians Practicing in 1982 in the Same State Where They Had Received Their Medical School and/or Residency Training, by Personal and Professional Characteristics of the Physicians and Characteristics of the Medical Schools and the States

Descriptor	Practicing Physicians*						
	Total	Medical School†		Residency‡		Medical School and Residency§	
		No.	Percent	No.	Percent	No.	Percent
All physicians	294,650	115,737	39.3	150,509	51.1	87,430	29.7
Physician characteristics							
Sex							
Male	269,610	105,746	39.2	135,494	50.3	78,952	29.3
Female	25,040	9,991	39.9	15,015	60.0	8,478	33.9
Years since medical school graduation							
≤10	104,805	42,270	40.3	59,333	56.6	32,925	31.4
11-20	71,746	26,155	36.5	33,616	46.9	19,051	26.6
21-30	58,853	23,605	40.1	29,163	49.6	17,632	30.0
31-40	42,338	16,312	38.5	19,829	46.8	12,119	28.6
41-50	14,807	6,389	43.1	7,404	50.0	4,887	33.0
>50	2,101	1,006	47.9	1,164	55.4	816	38.8
Practice specialty							
General/family practice	44,909	22,005	49.0	25,028	55.7	16,133	35.9
Internal medicine	64,292	24,349	37.9	33,568	52.2	18,830	29.3
Surgery	62,224	23,763	38.2	28,982	46.6	17,243	27.7
Pediatrics	19,455	7,280	37.4	9,835	50.6	5,561	28.6
Obstetrics/gynecology	18,737	7,908	42.2	10,292	54.9	6,364	34.0
Radiology	15,962	5,920	37.1	7,839	49.1	4,570	28.6
Psychiatry	21,655	7,729	35.7	12,390	57.2	6,237	28.8
Anesthesiology	9,654	3,675	38.1	5,099	52.8	2,862	29.6
Other	37,762	13,108	34.7	17,476	46.3	9,630	25.5
School characteristics							
Type of medical school							
U.S. public	146,330	69,712	47.6	77,693	53.1	50,560	34.6
U.S. private	148,320	46,025	31.0	72,816	49.1	36,870	24.9
Reputation of medical school							
'Elite'	37,760	12,736	33.7	17,648	46.7	10,102	26.8
'Non-elite'	256,890	103,001	40.1	132,861	51.7	77,328	30.1

* All column percentages are computed by dividing the number in the column by the number in the total column at left.

† This column consists of (*a*) physicians who had completed only medical school in the state and (*b*) physicians who had completed both medical school and residency in the state. The latter group is also included in the next column and makes up the column at the extreme right.

‡ This column consists of (*a*) physicians who had completed only the residency in the state and (*b*) physicians who had completed both residency and medical school in the state. The latter group is also included in the preceding column and makes up the column at right.

§ All the physicians in this column are also included in the preceding two columns.

TABLE 1—*Continued*

Descriptor	Practicing Physicians*						
	Total	Medical School†		Residency‡		Medical School and Residency§	
		No.	Percent	No.	Percent	No.	Percent
State characteristics							
Population							
Lowest 20 percent	9,919	1,218	12.3	1,936	19.5	812	8.2
Second 20 percent	17,922	5,957	33.2	6,093	34.0	3,519	19.6
Third 20 percent	44,543	15,119	33.9	18,773	42.1	10,024	22.5
Fourth 20 percent	66,470	28,330	42.6	32,138	48.3	20,234	30.4
Highest 20 percent	155,796	65,113	41.8	91,569	58.8	52,841	33.9
Physician-population ratio							
Lowest 20 percent	20,881	8,620	41.3	7,959	38.1	5,872	28.1
Second 20 percent	27,964	13,778	49.3	12,062	43.1	9,366	33.5
Third 20 percent	69,034	31,276	45.3	35,858	51.9	22,615	32.8
Fourth 20 percent	68,742	27,017	39.3	34,035	49.5	20,735	30.2
Highest 20 percent	108,029	35,046	32.4	60,595	56.1	28,842	26.7
Per capita income							
Lowest 20 percent	25,383	10,363	40.8	9,977	39.3	6,723	26.5
Second 20 percent	36,079	15,680	43.5	15,511	43.0	10,727	29.7
Third 20 percent	73,425	31,524	42.9	35,361	48.2	23,487	32.0
Fourth 20 percent	81,635	36,573	44.8	50,218	61.5	29,209	35.8
Highest 20 percent	78,128	21,597	27.6	39,442	50.5	17,284	22.1

plicit retention programs by public schools. Little difference existed between the two types of schools when retention after residency was compared.

The reputation of a medical school was also related to the physicians' practice locations. The "elite" schools in Table 1 were defined as the 10 schools receiving the highest scores in a survey of medical school faculties conducted by Cole and Lipton (13). Physicians who attended "non-elite" schools had a higher propensity than those from "elite" schools to practice in the state where they graduated from medical school, where they received their residency training, or both.

The characteristics of the state affected the physician's choice to practice there. Table 1 shows three such characteristics: population, physician density, and economic prosperity. Physicians in the more populous states tended to have been trained in the state. Only 12 percent of the physicians in the 10 least populated states went to medical school in the state where they practiced; fewer than 20 percent completed residency there. On the other hand, 42 percent of physicians practicing in the 10 most populous states graduated from a medical school in the state where they practiced; almost 60 percent completed residency there; and over one-third pursued both undergraduate and graduate medical education in the state.

Data on the relation between location of training and location of practice were conflicting when states were ranked by physician density. The states with the highest physician-to-population ratio had the lowest percentage of practicing physicians who had graduated from medical school in the state. However, these states had the highest percentage of physicians who had completed most of their graduate training in the state.

Finally, greater economic prosperity in a state, as measured by per capita income, correlated with a higher percentage of the state's practicing physicians who were trained there. However, in each category of training, the 10 states with the highest income had a smaller percentage of their physicians who were trained in the state than did the next 10 richest states.

Table 2 presents data for 11 states chosen by the authors to illustrate the range of variations among the states regarding the location of their physicians' training. The contrasts are striking. Less than 6 percent of the U.S.-trained physicians practicing in Arizona attended medical school there. This finding was not surprising given the newness of the one medical school in the state and the recent migration of physicians to the southern and southwestern states (14). On the other hand, 74 percent of U.S.-trained physicians in Nebraska graduated from medical school there.

Some states clearly had a physician population made up predominantly of those who trained in the state: Illinois, Louisiana, New York, and Pennsylvania. Others—for example, Connecticut, Florida, Oregon, and Washington—were populated by physicians educated outside their borders. But some state showed more complex patterns of retention. California, for example, had a lower-than-average percentage (27.1 percent, compared with the national average of 39.3 percent) of practicing physicians who attended medical school in the state but a higher-than-average percentage (58.6 per-

TABLE 2

Numbers and Percentages of U.S.-Trained Physicians Practicing in 11 Selected States in 1982 Who Had Received Medical School and/or Residency Training in the Respective State

States	Total	Practicing Physicians*					
		Medical School†		Residency‡		Medical School and Residency§	
		No.	Percent	No.	Percent	No.	Percent
Arizona	3,971	224	5.6	907	22.8	151	3.8
California	41,998	11,365	27.1	24,606	58.6	9,676	23.0
Connecticut	5,188	539	10.4	1,935	37.3	344	6.6
Florida	11,912	1,690	14.2	3,506	29.4	1,086	9.1
Illinois	11,336	6,993	61.7	7,188	63.4	5,598	49.4
Louisiana	5,096	3,545	69.6	3,272	64.2	2,817	55.3
Nebraska	1,932	1,426	73.8	963	49.8	888	46.0
New York	23,843	13,627	57.2	18,738	78.6	11,913	50.0
Oregon	4,184	1,137	27.2	1,515	36.2	647	15.5
Pennsylvania	15,841	10,284	64.9	11,293	71.3	8,726	55.1
Washington	6,679	1,184	17.7	2,444	36.6	591	8.8

* All column percentages are computed by dividing the number in the column by the number in the total column at left.

† This column consists of (*a*) physicians who had completed only medical school in the state and (*b*) physicians who had completed both medical school and residency in the state. The latter group is also included in the next column and makes up the column at the extreme right.

‡ This column consists of (*a*) physicians who had completed only the residency in the state and (*b*) physicians who had completed both residency and medical school in the state. The latter group is also included in the preceding column and makes up the column at right.

§ All the physicians in this column are also included in the preceding two columns.

TABLE 3

Percentages of Active Physicians Trained in 11 Selected States Who Were Practicing in the Respective State in 1982

State	Practicing Physicians*		
	Medical School†	Residency‡	Medical School and Residency§
Arizona	41.4	50.8	69.3
California	70.1	72.2	83.9
Connecticut	18.0	41.5	43.3
Florida	49.8	63.1	80.4
Illinois	31.2	50.1	58.4
Louisiana	40.4	48.7	64.1
Nebraska	23.4	49.8	55.6
New York	37.2	48.4	56.2
Oregon	41.7	55.2	67.6
Pennsylvania	39.1	53.3	63.6
Washington	51 0	52.9	75.9

* The fraction from which the percentages were derived for the first two columns of figures had a denominator consisting of all physicians trained in the state who were practicing in the United States in 1982 and a numerator consisting of all physicians trained in the state who were practicing in the respective state in 1982. For the third column of figures, the fraction from which the percentages were derived had a denominator consisting of all physicians who received both their medical school degree and their residency training in the state and who were practicing in the United States in 1982 and a numerator consisting of all physicians who received both their undergraduate and graduate training in the state and who were practicing in the respective state in 1982.

† This column consists of (*a*) physicians who had completed only medical school in the state and (*b*) physicians who had completed both medical school and residency in the state. The latter group is also included in the next column and makes up the column at the extreme right.

‡ This column consists of (*a*) physicians who had completed only the residency in the state and (*b*) physicians who had completed both residency and medical school in the state. The latter group is also included in the preceding column and makes up the column at right.

§ All the physicians in this column are also included in the preceding two columns.

cent, compared with the national average of 51.1) who had completed residencies there.

Of the 294,650 graduates of U.S. medical schools who were practicing in the United States as of December 31, 1982, 39.3 percent were in the state where they attended medical school. Similarly, 51.1 percent of the 294,650 who received their graduate training in a state remained there to practice. A subset of the 294,650 physicians received both medical school education and graduate training in the same state. This subgroup totaled 134,691 physicians. Of this smaller group of 134,691 physicians, 64.9 percent (87,340) remained in that state to practice. This progressively higher retention rate reflects the results of previous studies (1, 2, 4).

Table 3 displays physician retention rates for the 11 states included in Table 2. The data confirm the results of earlier studies (1, 2, 4) showing that the probability that a physician will practice in the state where he received medical training is higher later in the educational process;

that is, a residency in the state leads to greater retention than medical school in the state. In each case, retention is highest, however, if a physician received both undergraduate and graduate training in the state.

Although, as shown in Table 2, only 6 percent of Arizona's 1982 physicians had graduated from medical school there, 41 percent of the University of Arizona College of Medicine graduates who were in practice in 1982 were practicing in the state of Arizona; and 69 percent of those who received both medical school and residency training remained to practice there (Table 3). Similarly, although most of California's physicians were trained out of state, 70 percent of California medical school graduates stayed, as did 84 percent of those who received both medical school and residency training there. On the other hand, Louisiana retained only 40 percent of its medical school graduates, even though (as shown in Table 2) 70 percent of Louisiana's physicians had graduated in the state.

The authors sought to determine whether the location patterns of foreign medical graduates practicing in the United States at the end of 1982 differed from that of U.S. graduates. The percentages of FMGs who practiced in the state where they received their graduate medical training were strikingly similar to those of U.S. graduates, 51.5 percent compared with 51.1 percent for U.S. medical graduates. As was true for the U.S. graduates, the FMG women physicians, FMG older physicians, FMG general/family practitioners, and FMG psychiatrists had the highest probability of practicing where they received most of their graduate training. Those states with the highest proportions of FMGs trained in-state were similar to those with the highest proportions of U.S. graduates trained in-state; these were the more populous states with higher physician density and higher per capita income.

Discussion

The results of the present study indicate a strong correlation between location of training and location of practice for a physician. They also suggest that the medical education system can be used by a state to increase the number of physicians who practice there.

Variations in the characteristics of the students and schools or of the levels of medical education limit the ability of a state to use its educational system to achieve a preferred number of practicing physicians. Table 1 shows, for example, that women physicians and general/family practitioners were most likely to remain in the state where they received their graduate medical education. If desired, a state could recruit women students or residents in hopes of improving the retention of its graduates. A state could also increase the number of family practice residencies if it wanted to improve retention of family practice physicians, since it is difficult to identify early in their careers which students will subsequently enter family practice. On the other hand, if the state's primary purpose is retention of its graduates, the state should try to limit the number of students who plan to specialize in pathology and the number of pathology residencies.

Similarly, the type of medical school affects retention. Graduates of public medical schools are more likely to remain in the state than graduates of private medical schools. However, this conclusion must be tempered by the fact that most public medical schools give preferential treatment to in-state applicants, thus biasing their retention rates upward. Improving the reputation of a medical school will probably not alone improve the state's ability to retain graduates in the state. In effect, as a school gains renown, it both attracts students with less attachment to the state and expands the locational opportunities available to its graduates.

It is also clear from this study that the location of a physician's residency exerts a more powerful influence on subsequent practice location than does the location of medical school. This might suggest that a state interested in attracting practicing physicians should concentrate more resources on graduate medical education than undergraduate training. Further, a state may choose to encourage its medical graduates to remain in the state for their graduate medical education. Such a strategy may be hampered by the fact that students choose their residencies in part in locations where they wish to practice in the future. Thus, public policy in this area may have only a minor impact on physicians' choices of practice location.

Another finding showed little variation in state retention rates between U.S. medical graduates and foreign medical graduates. This finding implies that FMGs in residency programs who will remain in the United States can be considered by a state as a resource for future as well as current medical care services, just as U.S. graduates are.

States have adopted a variety of strategies (either explicitly or implicitly) to attract physicians to their states via the medical education system. Louisiana, for example, trains many physicians who leave the state; 70 percent of the physicians practicing in the state in 1982 had graduated from medical school there, but the medical school system had only an average retention rate (40.4 percent compared with 39.3 percent for all states). New York also has an extensive education system that trains most of its practicing physicians (78.6 percent of the physicians practicing in New York received residencies in the state); but the state exports a greater-than-average percentage of the physicians it trains in residencies (only 48.4 percent remain in the state versus 51.1 percent for all states).

California has concentrated its efforts on graduate medical education. Despite a dramatic increase in the number of students graduated from California medical schools in the past two decades (15) and a high retention rate of its graduates, most of the practicing physicians in California earned their medical degrees in other states.

Finally, both Connecticut and Arizona rely heavily on other states to train the physicians who practice there. However, the University of Arizona College of Medicine has been more successful at retaining its graduates than the two medical schools in Connecticut. In addition, residency programs in Arizona have a higher aggregate retention rate than those in Connecticut, and individuals who complete both medical school and residency in Arizona are more likely to stay in the state than such physicians trained in Connecticut.

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DATAGRAM

Results of the NRMP for 1986

The number of U.S. seniors who enrolled in the National Resident Matching Program (NRMP) in 1986 decreased by 198 from a year ago (1). The number who subsequently withdrew decreased by 86, the number of active applicants decreased by 112, and the number who were unmatched decreased by 115.

TABLE 1

Participation in the National Resident Matching Program in 1986

Category	U.S. Senior Students		Other U.S. and Canadian Citizens*		Alien Foreign Graduates		Total Applicants	
	No.	Percent	No.	Percent	No.	Percent	No.	Percent
Applicants	15,981	100.0	4,924	100.0	5,705	100.0	26,610	100.0
Withdrew	1,244	7.8	1,966	39.9	2,043	35.8	5,253	19.7
Active participants	14,737	92.2	2,958	60.1	3,662	64.2	21,357	80.3
Matched	13,756	93.3	1,501	50.7	879	24.0	16,136	75.6
Unmatched	981	6.7	1,457	49.3	2,783	76.0	5,221	24.4
Total	14,737	100.0	2,958	100.0	3,662	100.0	21,357	100.0

* Other U.S. and Canadian citizens consist of graduating students from U.S. osteopathic schools and Canadian medical schools; physician candidates, that is, earlier U.S. graduates seeking an entering position in graduate medical education; "fifth pathway" students, who are U.S. nationals who completed course requirements for a medical degree abroad followed by a year of clinical training in a U.S. hospital under medical school sponsorship; and U.S. foreign medical graduates.

The total number of other U.S. and Canadian citizens ("fifth pathway" students, U.S. graduates of foreign medical schools, physician candidates [earlier U.S. graduates seeking an entering position in graduate medical education], and U.S. osteopathic school and Canadian medical school graduates) who applied to the match this year decreased by 408. Among these other U.S. and Canadian citizens, the number of fifth pathway applicants decreased from 407 to 305; 240 participated in the match, and 77 percent were successful. The number of graduates of osteopathic schools who initially applied to the match increased from 631 to 774, a three-fold increase since 1983; 67 percent of those in 1986 were matched. The number of physician applicants also increased, and 52 percent were successful in the match.

The number of foreign medical graduates (FMGs) who applied decreased by 1,903. Of the 7,659 who applied, 1,954 were U.S. citizens; the number of U.S. FMGs decreased by 25 percent, and the proportion of U.S. FMGs unmatched increased by 1 percentage point to 61.4 percent. The number of alien FMGs decreased by 18 percent, and the percentage unmatched decreased by 2 percentage points.

The number of positions offered for the first postgraduate year increased by 235; 266 more were offered in the generalist* specialties than in 1985 (Table 2), an increase of 0.7 percentage points to 65.5 percent. The ratio of positions per initially enrolled applicant was 0.7; the ratio of positions per all U.S. senior and other U.S.-Canadian citizen applicants was 0.9, and that per U.S. senior was 1.2. The

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* "Generalist" specialties are defined as family practice, internal medicine, obstetrics/gynecology, and pediatrics.

TABLE 2

Positions Offered and Filled by Specialty and Type of Applicants in the NRMP in 1986

Specialties	Positions Offered		Applicants Matched												
			U.S. Senior Students			Other U.S. and Canadian Citizens‡			Alien Foreign Graduates			Total Applicants		
	No.	Percent*	No.	Percent		No.	Percent		No.	Percent		No.	Percent	
				*	†		*	†		*	†		*	†
Family practice	2,390	12.7	1,680	12.2	70.3	245	16.3	10.3	35	4.0	1.5	1,960	12.1	82.0
Internal medicine	6,912	36.8	4,994	36.3	72.3	570	38.0	8.2	421	47.9	6.1	5,985	37.1	86.6
Pediatrics	1,944	10.4	1,366	9.9	70.3	168	11.2	8.6	189	21.5	9.7	1,723	10.7	88.6
Obstetrics/gynecology	1,048	5.6	866	6.3	82.6	93	6.2	8.9	15	1.7	1.4	974	6.0	92.9
Psychiatry	932	5.0	651	4.7	69.8	70	4.7	7.5	61	6.9	6.5	782	4.8	83.9
Medical specialties	80	0.4	44	0.3	55.0	3	0.2	3.8	5	0.6	6.3	52	0.3	65.0
Dermatology	9	0.0	5	0.0	55.6	0	0.0	0.0	0	0.0	0.0	5	0.0	55.6
Neurology	50	0.3	22	0.2	44.0	3	0.2	6.0	4	0.5	8.0	29	0.2	58.0
Ophthalmology	21	0.1	17	0.1	81.0	0	0.0	0.0	1	0.1	4.8	18	0.1	85.7
General surgery	2,322	12.4	1,796	13.1	77.3	150	10.0	6.5	48	5.5	2.1	1,994	12.4	85.9
Surgical specialties	504	2.7	450	3.3	89.3	40	2.7	7.9	4	0.5	0.8	494	3.1	98.0
Neurosurgery	31	0.2	27	0.2	87.1	0	0.0	0.0	2	0.2	6.5	29	0.2	93.5
Orthopedics	342	1.8	307	2.2	89.8	33	2.2	9.6	2	0.2	0.6	342	2.1	100.0
Otolaryngology	42	0.2	39	0.3	92.9	1	0.1	2.4	0	0.0	0.0	40	0.2	95.2
Urology	83	0.4	71	0.5	85.5	6	0.4	7.2	0	0.0	0.0	77	0.5	92.8
Plastic surgery	6	0.0	6	0.0	100.0	0	0.0	0.0	0	0.0	0.0	6	0.0	100.0
Support specialties	1,449	7.7	1,007	7.3	69.5	87	5.8	6.0	56	6.4	3.9	1,150	7.1	79.4
Anesthesiology	330	1.8	268	1.9	81.2	9	0.6	2.7	3	0.3	0.9	280	1.7	84.8
Emergency medicine	270	1.4	242	1.8	89.6	23	1.5	8.5	1	0.1	0.4	266	1.6	98.5
Pathology	477	2.5	197	1.4	41.3	31	2.1	6.5	48	5.5	10.1	276	1.7	57.9
Physical medicine	78	0.4	63	0.5	80.8	3	0.2	3.8	2	0.2	2.6	68	0.4	87.2
Preventive medicine	8	0.0	1	0.0	12.5	2	0.1	25.0	2	0.2	25.0	5	0.0	62.5
Diagnostic radiology	265	1.4	223	1.6	84.2	18	1.2	6.8	0	0.0	0.0	241	1.5	90.9
Therapeutic radiology	21	0.1	13	0.1	61.9	1	0.1	4.8	0	0.0	0.0	14	0.1	66.7
Transitional	1,189	6.3	902	6.6	75.9	75	5.0	6.3	45	5.1	3.8	1,022	6.3	86.0
Total	18,770§	100.0	13,756	100.0	73.3	1,501	100.0	8.0	879	100.0	4.7	16,136	100.0	86.0

* Percent distributions of positions offered and filled among specialties (percentages may not add because of rounding).

† Percent of positions offered in specialty that were filled by applicants. §‡ See Table 1 footnote.

§ In addition, 240 postgraduate year-2 positions were offered; 166 U.S. senior students and 16 earlier U.S. graduates were matched to them.

ratios for these three groups of active applicants in the match were, respectively, 0.9, 1.1, and 1.3.

The overall filling of positions decreased by 3 percentage points, the filling of positions by U.S. seniors by 0.9 percentage point, and the filling by other applicants by a total of 1.1 percentage points. The most competitive programs were in emergency medicine, obstetrics/gynecology, orthopedic surgery, and diagnostic radiology. The participation of programs and positions in orthopedic surgery increased slightly. The low number of positions in neurological surgery, otolaryngology, and urology is attributable to the withdrawal of many programs in order to participate in non-NRMP matches. Again, only a few programs in plastic surgery participated in the match. The distribution of matched U.S. seniors among types of programs increased slightly in family practice, pediatrics, obstetrics/gynecology, and psychiatry; and the percentages of U.S. seniors entering general surgery and the support specialties decreased slightly.

Advanced programs for students (postgraduate-year-2 [PGY-2]) positions were again offered in the match this year. Sixty-five programs offered 240 positions. Forty-nine programs in diagnostic radiology offered 180 PGY-2 positions, of which 73 percent were filled with U.S. senior students and 16 percent were filled with physician applicants for a total fill rate of 82 percent. Most of the senior students were also matched to PGY-1 positions in the match. For the 1987 match, the chairmen of anesthesiology and orthopedic surgery programs have indicated their intent to enroll their PGY-2 and PGY-1 programs.

For the third year, couples were not allowed to withdraw from the match to accept positions outside the match, and a paired choice algorithm was used. This change resulted in the participation of 720 individuals as 360 couples; 93 percent of these U.S. students were successfully matched.

Several specialty matches for physician candidates were carried out by the NRMP in 1985. In the summer, 120 programs offered 284 positions for fellowships in respiratory disease; 236 physicians matched to 76 percent of these positions. In the fall, 24 programs offered 46 positions in colon and rectal surgery; 100 percent were filled by 57 percent of the applicants. Late in the fall, 31 programs in emergency medicine offered 179 positions; 99 percent of them were filled by 35 percent of the physician applicants. In the specialty match for dermatology last fall, there were 546 applicants for 223 positions. A total of 217 (40 percent) physicians were matched to fill 97 percent of the positions.

A new match, called the Medical Specialties Matching Program, is underway for fellowships in respiratory disease, plus all of the subspecialties of internal medicine. This match occurred in May 1986 for positions beginning in July 1987.

Data that describe the trends in numbers of positions offered and filled by U.S. seniors and other applicants during the past several years are included in the NRMP's annual directories (2).

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DATAGRAM

Financial Assistance for Medical Students, 1984–85

The Association of American Medical Colleges (AAMC) collects data through the Liaison Committee on Medical Education (LCME) annual questionnaire from its member medical schools concerning financial assistance awarded to medical students. The following summary and analysis of 1984–85 data is the third of an annual series published on this subject (1, 2).

Table 1 lists the financial assistance

TABLE 1

Sources of Medical Student Financial Assistance

Sources	1983–84			1984–85		
	Total Amount (In millions)	No.	Average Amount	Total Amount (In millions)	No.	Average Amount
Scholarships						
Administered by schools						
Exceptional financial need	$ 2.5	173	$14,334	$ 2.4	147	$16,326
Medical Scientist Training Program	7.2	525	13,719	8.6	586	$14,675
School funds	30.0	12,741	2,426	35.0	13,583	2,576
Other scholarships	10.7	6,463	1,654	11.1	6,849	1,621
Subtotal	50.4			57.1		
Not administered by schools						
Armed Forces health professions	51.2	3,289	15,575	52.3	3,080	16,981
National Health Service Corps	9.1	661	13,691	4.0	246	16,260
National medical fellowships	1.2	811	1,528	0.9	697	1,291
Other (with service commitment)	9.5	1,823	5,206	9.1	1,542	5,901
Subtotal	71.0			66.2		
Total scholarships	121.4			123.3		
Loans						
Administered by schools						
Health professions student loans	22.0	8,925	2,459	19.0	7,647	2,484
Guaranteed student loans	7.2	1,471	4,840	3.2	670	4,776
National direct student loans	18.2	8,729	2,087	18.5	9,259	1,998
Loans from school funds	22.7	8,939	2,540	26.8	9,757	2,746
Subtotal	70.1			67.5		
Not administered by schools						
Guaranteed student loans	188.6	39,052	4,829	186.6	39,329	4,744
Health education assistance loans	78.8	9,830	8,013	91.7	10,764	8,519
Parental loans for undergraduate students (ALAS/PLUS)	18.0	6,245	2,884	27.2	9,491	2,918
Other loans	6.2	2,614	2,370	6.8	2,811	2,419
Subtotal	291.6			312.3		
Total loans	361.7			379.8		
College Work Study Program	2.7	1,768	1,521	2.7	1,968	1,371
Grand total	485.8			505.7*		

* Total does not add due to rounding.

awarded to medical students from all known sources for the 121 institutions reporting in 1984-85, along with data from the 120 that responded in 1983-84. In 1984-85, a record total amount of financial assistance went to medical students—over $505 million, an increase of 4.1 percent over the previous year (Table 2). Also evident in 1984-85 was a continuing trend of reliance on loans, particularly high interest ones, to finance medical education and a significant increase in the amount of institutional assistance made available to medical students.

Medical students' need for financial assistance is, of course, closely linked to tuition, fees, and living expenses. In 1984-85, tuition and fees at private U.S. medical schools rose in the aggregate by 7 percent, and living expenses rose by 13 percent. At public institutions, average tuition and fees for resident students increased by 8.5 percent, while average living expenses at public schools rose by 3.5 percent. The fact that overall medical school costs rose much faster than the aggregate aid awarded to medical students accounts in part for the sharp rise in unmet need for students. Unmet need in 1984-85 was up $10.5 million, or almost 32 percent, from the previous year's level.

TABLE 2

Changes in Financial Aid to Medical Students, 1975-76—1984-85

(Dollars in millions)

Academic Year	Total Assistance		Increase/Decrease from Previous Year	
	Current Dollars	Constant Dollars*	Amount†	Percent
1984-85	505.7	262.0	+19.9	+4.1
1983-84	485.8	262.4	+46.0	+10.5
1982-83	439.8	245.2	−25.6	−5.5
1981-82	465.4	275.4	+63.5	+15.8
1980-81	401.9	262.5	+63.9	+18.9
1979-80	338.0	250.6	+73.9	+28.0
1978-79	264.1	217.9	+57.7	+28.0
1977-78	206.4	183.3	+41.1	+24.9
1976-77	165.3	156.3	+16.5	+11.1
1975-76	148.8	148.8	+29.4	+24.7

* 1975 = 100.

† Current dollars.

The Guaranteed Student Loan (GSL) Program remained the cornerstone of medical student financing. In 1984-85 just under 60 percent of all medical students received such loans; they represented 37.5 percent of total medical student financial assistance. Overall, medical students were awarded $6 million less in GSL funds in 1984-85 than they were in the previous year. The smaller amount suggests that borrower eligibility for or student interest in the GSL program has plateaued, and that use of such loans will not increase or decrease dramatically unless borrower limits are altered or the financial situation of medical students changes significantly. The aggregate medical student GSL borrowing level of $228.7 million in 1981-82 now appears almost certainly to have been an anomaly, caused by the impending application of a GSL needs test on October 1, 1981, for borrowers with resources greater than $30,000 a year.

Medical student reliance on the Health Education Assistance Loan (HEAL) Program continued to increase in 1984-85, although at a slower pace than in recent years; borrowing increased by $12.9 million, or 16.3 percent, over the prior year. Increases had been 56.3 percent and 51.8 percent in the two previous years. The HEAL Program in 1984-85 provided 18 percent of all medical student aid; the program accounted for only 3.8 percent of such aid as recently as 1980-81. Borrowing under the ALAS/PLUS Program, another source of relatively unsubsidized loan capital, increased sharply for medical students in 1984-85, by $9.2 million or 51.1 percent. The sharp increase is due to the unavailability of more attractive loans as well as broader participation in the program by lenders.

The National Direct Student Loan (NDSL) Program and the Health Professions Student Loan (HPSL) Program, both established in the era when the federal government used highly subsidized loans to encourage participation in postsecondary education, continued to provide significant amounts of medical student loans. The NDSL Program provided $18.5 million and the HPSL Program $19 million in 1984-85. The latter figure represents a $3 million drop from the previous year. The decrease reflected an erosion of institutional revolving funds resulting from the lack of new federal capital contributions for the past three years.

Scholarship awards made to medical students in 1984–85 showed relatively little change from the previous year. Overall, scholarship funds increased by $1.8 million from 1983–84. National Health Service Corp (NHSC) scholarships changed more in percentage terms than any other scholarship program; unfortunately, this was a downward drop of $5.1 million, or 56 percent, from the previous year. Only 246 medical students received NHSC scholarships in 1984–85. At the height of the program's funding, in 1980–81, it provided 4,079 medical students with $50.1 million.

Scholarship and loans from internal institutional resources increased significantly in 1984–85, by $9.1 million or 17 percent. This increment was likely due to bleak prospects for new sources of scholarships or low-cost loans. At least some of these funds were deployed in an innovative fashion, for example, paying interest on high-cost loans during the in-school period.

The LCME data also showed the indebtedness of senior medical students. According to the survey, 1985 indebted seniors carried average debt burdens of $30,256, up 12.5 percent from the year before. Data provided on the annual AAMC graduation questionnaire for 1985 showed similar levels of indebtedness, indicating average indebtedness of $29,943 for the 87 percent of graduating seniors with debt.

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Factors Affecting Residents' Decisions To Moonlight

Gloria J. Bazzoli, Ph.D., and Steven D. Culler, Ph.D.

Abstract—Moonlighting by residents has been a major concern of residency program administrators, since extensive moonlighting by residents in addition to their already demanding residency work schedule might jeopardize patient care. In this paper, the authors examine the influence of several factors on residents' decisions to moonlight. The results indicate that the main motivating factor behind their moonlighting is economic and that residents moonlight more frequently when they have the opportunity to do so. In addition, the residents with higher levels of medical school indebtedness were significantly more likely to moonlight than residents with less indebtedness. Personal characteristics of the residents and their specialties also influenced moonlighting but had a smaller impact than amounts of stipends and indebtedness and the number of off-duty hours. The results also suggest that residency administrators can influence their residents' decisions to moonlight.

Although residents work long hours to fulfill their residency requirements, many choose to moonlight during their off-duty hours. Moonlighting by residents has been an area of concern to many residency administrators, as evidenced by an article in the *New England Journal of Medicine* by Moss (1) and by the letters to the editors that this article evoked. Moss identified two health policy questions that arise from the controversy over residents' moonlighting: (*a*) To what extent does moonlighting affect the ability of residents to provide safe, effective care in the residency and in the second job? (*b*) What factors influence a resident's decision to take a second job?

In the present paper, the authors address the second question by examining the influence of several factors on the residents' decisions to moonlight. The data used came from a 1979 survey that collected information on personal and family background characteristics of residents, characteristics of residency programs, time spent moonlighting by each resident, and income received from a moonlighting job. The analysis of these data provides evidence on the prevalence of moonlighting by residents and on the characteristics of residents who were most likely to moonlight.

In addition, the present study sheds light on a major debate in the literature about the primary motivating factor for moonlighting by residents. Moss (1) con-

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tended that economic hardship was the main force causing residents to moonlight. Gould (2), on the other hand, presented an alternative view, suggesting that residents moonlighted simply to gain nonnecessary, supplementary spending money. Moss argued correctly that the debate was "purely speculative and derived from conviction rather than from data." Although it is difficult to distinguish between a need for extra income for necessary expenses and a desire for nonnecessary discretionary spending money, the present study provides evidence that helps resolve this dispute over the primary motivation for residents' moonlighting.

Method

Data used in this analysis came from the 1979 Survey of Resident Physicians conducted by the American Medical Association (AMA) (3). The survey was designed to collect socioeconomic data from a representative sample of residents in all years of training. Questionnaires were mailed to approximately 10,000 residents in the spring of 1979, and completed surveys were returned by 3,403 (35 percent). This response rate is low but is good for resident physicians given their heavy work schedules and their frequent changes of address. The respondents were more often in earlier years of training and more often in residencies in general or family medicine or in internal medicine when compared with those who did not respond. These differences did not bias the results reported here, however, since residents are distinguished by training year and program specialty.

Of the residents who responded to the survey, nearly one-third held a second job during a typical week in 1979. Thus, moonlighting was fairly common, but the moonlighters in 1979 did not comprise the "silent majority" implied by the title of the Moss (1) article. In addition, the moonlighters in 1979 tended to work a substantial number of hours a week in their second jobs, an average of about 11 hours. The moonlighters received a mean wage of $19.74 per hour from their second jobs. In addition, the moonlighters had accumulated significantly more medical school debt on average than nonmoonlighters: $9,500 as compared with $7,800. The moonlighters in 1979 also had slightly lower average stipends ($15,000) than those who did not moonlight ($15,600). Finally, the mean number of hours of work in the residency was 60 hours per week for moonlighters as compared with 71 hours for nonmoonlighters. Clearly, high levels of debt, more off-duty time, and low resident stipends created incentives for the residents to moonlight.

The AMA survey provided data on a number of other factors likely to influence a resident's decision to moonlight. In particular, data on spouse's salary (if the resident was married) and on a resident's nonearned income were collected. The present authors assumed that low spouse salary and low nonearned income were likely to encourage residents to moonlight. Other factors assessed by the AMA survey that might affect the decision were: the resident's sex, age, family size, year of residency, graduation from a foreign versus U.S. medical school, and residency specialty. In all, 2,627 residents gave complete data on their moonlighting and on the factors that might have influenced their decision to moonlight, and these residents were the focus of the present study.

Given the multiplicity of factors that can influence decisions to moonlight, the authors conducted a multivariate analysis of the AMA survey data in 1985 (4). The authors sought in this 1985 study to estimate how the probability that an individual resident would moonlight was influenced by several factors, namely the amount of a resident's stipends, educational debt, potential moonlighting wages, and spouse's salary (if married); the resident's sex, age, family size, year of residency, specialty, and number of off-duty hours; and whether or not the resident was a foreign medical graduate. The multivariate analysis technique used in that study to measure the effect of each of these factors on the probability of moonlighting was an extension of ordinary least-squares regression analysis. An extension of this basic estimation procedure was necessary because the probability of moonlighting could only take values between zero and one and the ordinary least-squares regression does not take this restriction into account. With this extended estimation technique, the authors were able to measure the effect that each factor had on the probability of moonlighting while holding the effects of the other factors constant.

This 1985 multivariate analysis indicated that all the factors had a significant effect ($p = .05$) on the probability that a resident would moonlight. Therefore, the authors undertook a second analysis to estimate the probabilities that residents with different sets of socioeconomic and demographic characteristics would moonlight. In order to calculate these probabilities, the authors performed a comparative static analysis using the results of the multivariate analysis (4) and the original AMA survey data (3). This second analysis—the results of which are reported here—was specifically designed to allow the comparison of individuals with one set of characteristics with individuals with other sets of characteristics and to calculate the effect of changes in these characteristics on the probabilities being studied.

Results and Discussion

Table 1 shows data on the probability of moonlighting for different levels of medical school indebtedness, resident stipend, and hours of work in the residency program, and Table 2 gives probability data for different specialties and personal background characteristics of the residents. Analysis of the data indicated that the estimated probabilities of moonlighting varied to a large extent depending on the resident's year of residency. The probabilities given in the tables, therefore, were reported by residency year in order to display the large and significant differences by residency year.

Analysis for the present study also indicated that the three factors examined in Table 1 had a larger impact on residents' decisions to moonlight than those factors listed in Table 2. The first factor listed in Table 1 is medical school indebtedness. Each column shows the effect of indebtedness within a given year of residency for a given level of debt. All other factors that affect the decision to moonlight were held constant for the computation of the probabilities by level of indebtedness. Thus, only medical school indebtedness and year of residency were allowed to vary in this particular analysis. The data indicate that higher medical school indebtedness significantly increased the probability that a resident would moonlight. For example, nearly one in three first-year residents with $30,000 of medical school debt moonlighted while only one in five residents with no medical school debt did so. In addition, the probability of moonlighting for a fourth-year resident with medical school debt of $30,000 was 1.4 times larger than the probability for a fourth-year resident with no debt. One reason medical school debt affected the likelihood that a resident would moon-

TABLE 1

Probabilities of Moonlighting for 2,627 Residents Who Responded to a Survey of Residents by the American Medical Association for the Factors of Level of Medical School Indebtedness, Amount of Resident Stipend, and Number of Hours Worked in Residency, by Year of Residency Training, 1979

Factors	Residency Year			
	1	2	3	4 or more
Medical school indebtness*				
No debt	.212	.235	.261	.288
$ 5,000	.229	.254	.280	.304
$13,000	.257	.282	.310	.333
$20,000	.282	.310	.333	.366
$30,000	.322	.350	.378	.409
Resident stipend†				
$10,000	.376	.407	.436	.468
$13,600	.285	.312	.339	.368
$16,000	.213	.235	.261	.288
$21,000	.137	.157	.174	.198
Hours of work in residency‡				
45	.375	.404	.434	.465
50	.323	.350	.383	.408
65	.251	.278	.303	.332
85	.170	.192	.214	.236

* For each level of debt, the probabilities of moonlighting are significantly different ($p > .05$) across residency years. In addition, for each year, the probabilities are significantly different across the levels of debt indicated.

† For each level of resident stipend, the probabilities of moonlighting are significantly different across residency years. In addition, the probabilities are significantly different across stipend levels within each residency year.

‡ For each level of hours of work, the probabilities of moonlighting are significantly different across residency years. In addition, the probabilities are significantly different across hour levels within each residency year.

light is that residents typically must begin loan repayments in their third or fourth year of the residency (5).

Repayment of debt during the residency has an additional implication for a resident's probability of moonlighting over time. For instance, based on the data in this study, if a physician entered a residency with $20,000 of medical school debt but reduced this obligation to $13,000 by the fourth year of training, the probability that this physician would moonlight would be only 33.3 percent as compared with 36.6 percent if there had been no reduction of medical school debt.

The remaining two factors listed in Table 1 are of special importance since they can be directly influenced by residency directors. The residents with larger stipends, regardless of their year in training, had significantly lower probabilities of having a second job than residents with smaller stipends, when all other factors were held constant. The probability of moonlighting for a first-year resident earning a $10,000 stipend in 1979 was 37.6 percent compared with 13.7 percent for a similar resident earning a $21,000 stipend. Increasing a resident's stipend from $10,000 to $21,000 in 1979 reduced the probability that the resident would moonlight by more than one-half for each year of residency.

The second factor influenced by resi-

TABLE 2

Probabilities of Moonlighting for 2,627 Residents Who Responded to a Survey of Residents by the American Medical Association for the Factors of the Residents' Specialty and Characteristics, by Year of Residency Training, 1979

Factors	Residency Year			
	1	2	3	4 or more
Specialty*				
General or family practice	.203	.227	.251	.302
Internal medicine	.154	.174	.192	.239
Surgery	.174	.195	.218	.264
Pediatrics	.233	.258	.281	.337
Obstetrics-gynecology	.258	.284	.312	.367
Radiology	.268	.295	.323	.378
Psychiatry	.092	.106	.121	.154
Anesthesiology	.397	.425	.456	.512
Pathology	.104	.119	.136	.171
Other	.271	.298	.326	.382
Characteristics†				
Female	.159	.179	.201	.245
Male	.258	.284	.309	.370
U.S. medical graduate	.226	.251	.274	.330
Foreign medical graduate	.341	.371	.401	.460

* For each specialty, the probabilities of moonlighting are significantly different across residency years. In addition, probabilities of moonlighting are significantly different across specialties within each residency year.

† For each characteristic, the probabilities of moonlighting are significantly different across residency years.

dency directors is the hours of work in the residency program. Increasing the number of hours a resident is required to work significantly reduces the probability of moonlighting, according to results of the present study. Among fourth-year residents working only 45 hours per week, almost one in two moonlighted compared with less than one in four for fourth-year residents working 85 hours per week, when all other factors were held constant. If the hours of work required in a residency program decline as a resident progresses through the residency, then the more senior residents would have more time that they could spend on outside jobs. In addition, institutions may relax restrictions on moonlighting for residents in later training years, and this relaxation also adds to their ability to moonlight as they advance.

The likelihood that residents moonlight also depends on their specialty (Table 2). Regardless of residency year, the residents in anesthesiology, radiology, obstetrics-gynecology, and other specialties moonlighted significantly more often than residents in general or family practice, internal medicine, surgery, pediatrics, psychiatry, or pathology. Of those who moonlighted more frequently, one in four first-year residents in obstetrics-gynecology moonlighted, and up to one in two fourth-year residents in anesthesiology moonlighted. The range of probabilities for those less likely to moonlight was less than one in 10 for first-year psychiatry residents and almost one in four for fourth-year residents in internal medicine. It may be difficult for residents in the specialties that have fewer moonlighters to find jobs outside the residency, especially those in psychiatry. Emergency rooms which are the most prevalent employers of moonlighting residents, most frequently receive patients with physical or physiological emergencies rather than patients with psychiatric problems.

In each year of residency, the male residents were over 1.5 times more likely to moonlight than female residents, a statistically significant difference (Table 2). Female residents did, however, moonlight more frequently as they moved into later years of training: 1.5 in 10 first-year female residents moonlight compared with almost 2.5 in 10 female residents with four or more years of residency.

Finally, graduates of foreign medical schools were much more likely to moonlight than U.S. medical school graduates. First-year U.S. medical school graduates had a 22.6 percent probability of moonlighting as compared with a 34.1 percent probability for first-year foreign-trained residents. In fact, the probability that a first-year foreign medical graduate would moonlight was slightly greater than the probability that the most senior residents (4 or more years) from a U.S. medical school would moonlight.

Conclusions

The results of the study reported here provide useful insights into the factors influencing a resident's decision to moonlight. Medical school indebtedness played an important role in the decision to moonlight, especially in later residency years when repayments of some federal loans must begin. Residents with small stipends and residents with fewer hours spent in their residency programs were more likely to moonlight. A resident's specialty and background also influenced the decisions but played a less important role in these decisions than stipend, off-duty hours, and medical school indebtedness.

The overall results of the study lend some support to the claim by Moss (1) that the main motivating factor behind moonlighting is economic. The strong impacts of the levels of indebtedness and stipend indicate that residents who have particularly poor financial situations are very likely to moonlight. However, it is difficult to distinguish a true need from a mere desire for additional, discretionary income. Thus, more detailed data are needed to support the conclusion that the primary motivation for moonlighting is economic hardship.

The results reported here suggest that residency administrators have a substantial opportunity to influence residents' decisions to moonlight. For example, the residents were found to be highly affected by the amount of their stipends and the number of hours spent in the residency. Thus, the authors believe that administrators could decrease moonlighting by increasing the stipends and work requirements of the residencies.

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